VOL. VI. NO. 2 JULY, 1926

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1925

HONOLULU, HAWAII

PRICE 75 CENTS

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All correspondence should be addressed to the Secretary, Hawaiian Entomological Society, Honolulu, Hawaii, from whom copies of the Proceedings may be purchased.

Volume I of the Proceedings, for 1905-07 (in five numbers) contains 210 pages, 4 plates, and 5 text figures.

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PROCEEDINGS

OF THE

Hawaiian Entomological Society

VOL. VI, No. 2. FOR THE YEAR 1925. JULY, 1926

JANUARY 8, 1925.

The 229th meeting of the Hawaiian Entomological Society was held at the Hawaiian Sugar Planters' Association Experiment Station at the usual hour.

President Williams presided. Other members present were Messrs. Rosa, Swezey, Muir, Illingworth, Willard, Lutken, Van Zwaluwenburg, Bryan, Fullaway, Pemberton, and Ehrhorn.

The minutes of the last meeting were read and approved.

The Executive Committee reported that it had approved the bill for printing 1923 Proceedings, and that the bill had been paid by the trustees of the Hawaiian Sugar Planters' Association. Mr. Swezey moved that a vote of thanks be given to the Association for this assistance, and a copy of the Proceedings be sent to the members of the board of trustees. Carried. The following appointments were also reported: Custodian, Dr. F. X. Williams; Librarian, Joseph Rosa; Editor, O. H. Swezey.

PAPER.

"Observations on Chrysomyia Megacephala Fabr., Our Common Blow-Fly, in the Orient."

BY J. F. ILLINGWORTH.

NOTES AND EXHIBITIONS.

Monomorium fossulatum seychellense Emery. — Mr. Swezey exhibited queens and workers of this ant from a small colony that he had found among cane roots at Grove Farm Plantation, Kauai, April 21, 1922. This ant was first recorded by Mr. Tim-

berlake at the March, 1924, meeting of the Society, when he reported its having been determined by Doctor Wheeler. It was then recorded from Honolulu, Makiki and Puuloa, Oahu, and Honokaa, Hawaii. This Kauai record extends the distribution of this ant in the Islands. Recently Mr. Van Zwaluwenburg has found it in soil of cane-fields at Waipio, Kahuku and Puuloa, Oahu, which indicates that it has a very general distribution here.

Nesocrabro stygius (Blkb. and Cam.).—Mr. Swezey exhibited two males of this wasp which issued from cocoons that he found in an excavation in a piece of rotten wood of *Elaeocarpus* tree lying on the trail at about 1500 feet elevation in the forest above Kahuku, Oahu, November 23, 1924. The wasps issued December 8 and 11. Similar nesting habits for this wasp were recorded by Mr. Bridwell in 1916, he having found a nest provisioned with *Discritomyia* flies, which seems to be what were used in the present case, from the fragments remaining. Doctor Perkins has recorded this wasp as preying on these flies.

Syrphus opinator O. S.—Mr. Swezey exhibited a specimen of this syrphid fly which emerged December 31, 1924, from a puparium found in celery imported from California. This illustrates one way that an occasional immigrant insect may arrive. In this case a beneficial insect, if enough of them could arrive and become established, as it is a predator on plant lice.

Trigoniulus lumbricinus (Gerst.).—Mr. Swezey reported the recent determination of this large brown millipede by R. V. Chamberlain of the Museum of Comparative Zoology, Cambridge, Mass. Kirkaldy first recorded this Myriapod in December, 1906, as a recent immigrant. A number of years after that date it was occasionally found among cane trash at the Experiment Station, Hawaiian Sugar Planters' Association. The past three or four years it has been found more abundant, and at present is in countless thousands feeding in a compost heap composed of decaying sugar-cane leaves that have been heaped up for composting. The disintegration of the mass is greatly hastened by the feeding of these numerous millipedes. Mr. Chamberlain wrote of this millipede that it was probably East Indian in origin, but now widely distributed on tropical islands and in tropical countries and has reached the West Indies.

Orphnaeus brevilabiatus (Newp.).—This is a centipede which was also determined by Mr. Chamberlain at the same time as the above. It is a very slender one about three inches long when fully extended. Mr. Swezey found two specimens in an old mud-dauber wasp nest on the under surface of an overhanging rock in Waimalu Valley, Oahu, March 2, 1924. Mr. Chamberlain wrote that this was a tropicopolitan form, and that he had seen several other specimens from Hawaii. He did not state whether previously recorded from Hawaii. Perhaps this is the first record.

Odynerus oahuensis D. T.—Doctor Williams exhibited specimens of *Odynerus oahuensis* reared in December 26 (♂), December 31 (♀), 1924, from nests collected at Waikane, Oahu, December 14, 1924, and read notes on the habits of this wasp, which builds mud cells instead of utilizing holes in soil or rock as other native species of *Odynerus* do.

Fiji Topography and Flora.—Mr. Bryan exhibited a large series of photographs illustrating Fiji topography and flora. They were taken by him during his exploration trip there in 1924.

Coptotermes intrudens Oshima.—Mr. Swezey reported finding specimens of this termite in a telephone pole a mile up in Palolo Valley.

Plague Flea.—Mr. Pemberton exhibited specimen of the plague flea (*Xenopsylla cheopis* Roths.) and gave notes on its occurrence in Hawaii. He stated also that the common flea on dogs here is the cat flea (*Ctenocephalus felis* (Bouche)), and that the dog flea has not been found in Hawaii.

FEBRUARY 5, 1925.

The 230th regular meeting of the Hawaiian Entomological Society was convened at the usual place at 2:30 p. m., President Williams in the chair. Other members present: Messrs. Bryan, Crawford, Ehrhorn, Giffard, Illingworth, Lutken, Muir, Pemberton, Rosa, Swezey, Van Zwaluwenburg, and Willard. Prof. J. H. Comstock and Anna Botsford Comstock were visitors.

The minutes of the January meeting were read and approved.

Mr. Giffard read a radiogram to the Bishop Trust Company of Honolulu, notifying them of the death of Mr. Albert Koebele, an honorary member of this society.

Upon motion of Mr. Giffard, it was voted that the president appoint a committee to write an obituary, and to formulate a resolution expressing the regrets of the society occasioned by the loss of such an esteemed member; both of which to be read at our next meeting.

On invitation of the president, Professor and Mrs. Comstock made a few remarks.

Professor Comstock expressed surprise at finding such a strong organization of entomologists in Hawaii. He stated that, although he had taught many economic entomologists, he felt like a novice in economic entomology here, where so much had been, and is being, accomplished along that line. His account of the development of the Department of Entomology at Cornell University was of particular interest. When he entered Cornell in 1871, there was no course in entomology there, although interest in the subject was beginning to be manifest. During his sophomore year, 1872, he was called upon to deliver a course of lectures in Entomology, while during his junior year he was made Instructor in Entomology. Dr. David Starr Jordan, for many years president of Stanford University, and Dr. L. O. Howard, chief of the Bureau of Entomology, United States Department of Agriculture, were both students of his during these first two years. Many of the prominent entomologists of today received their early training under Professor Comstock at Cornell. From the modest beginning of a course of lectures given by one instructor in 1872, the Department of Entomology steadily grew under the direction of Doctor Comstock, until some ten years ago, when he relinquished active charge of the department, it required thirty professors and instructors to care for the students desiring instruction in Entomology.

Mrs. Comstock gave an interesting account of her work in Entomology, stating that she began her work by assisting her husband in making pictures of microscopic insects. Later she learned wood-engraving, to assist him in publishing his "Manual

for the Study of Insects." She said that she had been working in Nature Study for the past thirty years, and related considerable of her experiences therewith.

PAPERS.

"The Genus Popillia, with Its Natural Enemies in the Orient."

BY J. F. ILLINGWORTH.

"The Common Muscoid Flies Occurring About Sweet-Shops in Yokohama, Japan."

BY J. F. ILLINGWORTH.

"Distressing Itch from a Moth, Euproctis flava Bremer, in the Orient."

BY J. F. ILLINGWORTH.

NOTES AND EXHIBITIONS.

Lysiphlebus testaceipes Cress. Mr. Swezey reported finding this braconid established in a corn-field at the United States Agricultural Experiment Station January 24, 1925, where there was considerable infestation by *Aphis maidis* Fitch. The parasite was introduced from Whittier, California, in February, 1923. Mr. Timberlake found aphids highly parasitized by it there at that time and sent a quantity of material to Honolulu, from which nearly 4000 parasites issued for liberation. These were liberated about Honolulu in many places where infestations by various aphids were found. This is the first record of its recovery. On February 4, a few cane aphis were found parasitized by it at the Experiment Station, Hawaiian Sugar Planters' Association, where the aphis was very scarce.

Parasite of Gray Sugar-Cane Mealybug.—Mr. Swezey reported rearing a new parasite from *Pseudococcus calceolariae*, collected January 17 on sugar-cane at the Manoa substation. Fourteen of them had already issued from a few of the mealybugs brought in. This is the first recovery of this undetermined mealybug parasite, which was introduced from Mexico in 1922.

Three specimens were found in the collection, labeled as reared by Osborn from *P. calceolariae,* July, 1922, at El Potrero, Vera Cruz, Mexico. Several mealybug parasites were being sent from Mexico at that time, and this must have been among them, but no definite records of it were found.*

Bruchus Near Coryphae Oliv.—Mr. Swezey reported finding seeds of *Ipomoea pes-caprae* infested by this beetle on the beach east of Waimanalo, February 1, 1925. This extends its known distribution from Barber's Point around the south coast to Waimanalo.

Desmometopa m-nigrum (Zett.).—Mr. Illingworth bred this agromyzid fly in abundance from mascerated hen manure in March, 1916. (See Proc. Haw. Ent. Soc., Vol. V, p. 270.) Specimens were sent at that time to the United States National Museum for identification, and recently Doctor Aldrich of that institution has identified it as above.

Lispa metatarsalis Thoms.—On May 20, 1916, Mr. Illingworth captured a specimen of this anthomyid fly and sent it to the United States National Museum for determination. Doctor Aldrich has recently determined it as above. Apparently the specimen sent became broken, for Doctor Aldrich returned the pin containing the data, and also a specimen collected by W. H. Ashmead, having the following data: "Kilauea, Hawaii, 4000 feet altitude, 21.7." This is the only known specimen now in Hawaiian collections, though the species was described from Honolulu by Thomson in 1868.

Pulsation of Dorsal Vessel of Wasp Larvae.—Mr. Williams stated that the pulsation of the dorsal vessel of wasp larvae may be slower or faster, according to the physiological condition of the larva. It is slow when hibernating and quite fast when the larva is approaching pupation. In the rolled up and more wrinkled larvae, there are from five to nine beats per minute; while in the distended and unrolled larvae near pupation there are from thirty to thirty-two beats. He observed also that the

* Specimens were sent to Mr. Timberlake, who determined them as *Thysanus dactylopii* (Ashm.), and expressed the opinion that it was a secondary parasite.

heart beats of a tiger beetle larva, which had been paralyzed by a Brazilian Pterombus wasp, were 12.5 per minute; while the pulsations of the normal beetle larva were about thirty per minute. He noticed that after several minutes of beats there would be a pause or rest in the pulsations. A similar pause had been noticed in 1924 by Gerould in a chrysalis of the butterfly *Colias eurytheme*.

Koenenia sp., belonging to the Palpigrada (Arachnida), was reported by Mr. Van Zwaluwenburg as first being recorded at the December, 1924, meeting as occurring in soil in Honolulu; but since it has later been found in soil samples from points as far apart as Honolulu, Waianae, and Kahuku, it is probably generally distributed on Oahu.

MARCH 5, 1925.

The 231st meeting of the Hawaiian Entomological Society was convened at 2:30 p. m. at the Experiment Station of the Hawaiian Sugar Planters' Association, President Williams presiding. Other members present were Messrs. Bryan, Crawford, Ehrhorn, Illingworth, Lutken, Muir, Giffard, Rosa, Swezey, and Willard. Prof. and Mrs. J. H. Comstock, R. W. Paine, and T. H. C. Taylor were visitors.

The minutes of the 230th meeting were read and approved.

A committee consisting of Mr. O. H. Swezey, Mr. W. M. Giffard, and Mr. F. Muir reported on the obituary of the late Mr. Albert Koebele.

NOTES AND EXHIBITIONS.

Danaus archippus Fabr.—This milkweed butterfly was recorded by Doctor Illingworth as a serious pest of an introduced shrub, *Calotropis gigantea* R. Br., which belongs to the milkweed family. This shrub is an introduction from India. The flowers are commonly used by the native Hawaiians for making leis. A large specimen of this plant in the Bishop Museum yard, has been almost entirely defoliated by the caterpillars during the past month.

Ptychomia remota Aldrich. — Mr. Bryan exhibited paratype specimens of this tachinid fly, which is a parasite of the xygaenid moth, *Artona catoxantha* Hamps., in the Federated Malay States. The moth is a serious enemy of coconut trees and is related to *Levuana iridescens* B.-B., the bad coconut pest of Fiji. The flies were bred by B. A. R. Gater, Kuala, Lumpur. The specimens were sent to the Bishop Museum by Doctor Aldrich, whose description is published in the Proc. Ent. Soc., Washington, Vol. 27, p. 13, January, 1925.

Xiphidiopsis lita Hebard.—A living female of this phasgonurid was exhibited by Mr. Swezey, with remarks on its habits. He had found that she ate corn aphis very voraciously, in confinement. When given 13 inch-long *Spodoptera* caterpillars, she had eaten them in two days. Apparently this is a beneficial insect. Further experiments will be made on its food habits.

Allograpta obliqua Say.—Mr. Swezey reported that four specimens of this syrphid fly had issued from a mass of leaves of Poinsettia infested with the mealybug *Pseudococcus virgatus*, which Q. C. Chock, Mr. Fullaway's assistant, was using in breeding lady beetles. This is an aphis-feeding species, but apparently it will feed on mealybugs also.

**Archytas* sp.—Mr. Swezey exhibited a specimen of this Mexican tachinid fly, caught by him on Hilo grass along the Manoa Cliffs trail on Mount Tantalus, February 23, 1925. This fly was reared by Mr. Osborn from armyworms collected in sugarcane at Los Mochis, Sinaloa, Mexico, in January and February, 1924. A batch of pupae of *Cirphis latiuscula* Herr.-Sch. were sent to the Experiment Station. They were received February 12. From these, fifteen tachinids of three species issued, 1, 3, and 11 of each, respectively, from February 12 to 26, mostly February 20 to 24. Nine of these flies were liberated February 25 at the United States Experiment Station in a citrus orchard where there were armyworms on nutgrass. Doctor Williams observed one or more of the flies in another part of the station grounds about February 20, 1925, which was the

* Specimens have been named *Archytas cirphisae* n. sp. by Mr. C. H. Curran, but no published description has yet come to our notice.—Editor.

first intimation that they had become established. The present capture at so distant a place would indicate that it is well established.

Cylene crinicornis Chevr.—Mr. Swezey exhibited a specimen of this longicorn beetle reared from a log of *Poinciana regia* wood, and reported having reared it similarly from *Albizzia lebbek*. This is the beetle known as the kiawe beetle on account of its habit of breeding so commonly in felled kiawe trees. These records indicate that it is not restricted to kiawe as a host.

Lycaena blackburni Tuely.—A specimen of this native Hawaiian butterfly was exhibited by Mr. Swezey, which had been found by him at rest on a ladder on a Japanese naval boat berthed at Pier 9, Honolulu harbor, February 28, 1925. It is the first time the species has been taken by him at sea-level, as it usually remains in the mountain forests. A specimen of it was also taken in February, 1925, in the citrus orchard of the United States Experiment Station.

Mrs. Comstock gave a very entertaining talk on her observations of entomologists, which was followed by a talk by Professor Comstock, in which he gave some very interesting reminiscences of his early experiences in Entomology.

APRIL 2, 1925.

The 232nd meeting of the Hawaiian Entomological Society was held at the usual place at 2:30 p. m., President Williams in the chair. Other members present: Messrs. Bryan, Crawford, Ehrhorn, Giffard, Lutken, Muir, Swezey, Rosa, Illingworth, Van Zwaluwenburg, and Willard. D. LeRoy Topping was a visitor.

The minutes of the 231st meeting were read and approved.

The acting secretary reported that $30 had been voluntarily subscribed by members of the society, and sent to the Zoological Society of London to assist in the publication of the Zoological Record.

PAPERS.

* "Oestrus ovis and Ocular Myiasis."

BY D. L. CRAWFORD.

"Notes on Sarcophaga fuscicauda Böttcher (Diptera)."

BY J. F. ILLINGWORTH.

"Notes on Chrysomyia megacephala Fabr. (Diptera)."

BY J. F. ILLINGWORTH.

NOTES AND EXHIBITIONS.

Xylocopa varipuncta Patton.—Mr. Williams noted that this insect, feeding on Convolvulus flowers in Honolulu, evidently knew that it could not force its bulk far into the corolla, paused but a moment, if at all, at the wide bell, then flew over the top of the flower and drew the nectar through a slit made at the base of the corolla. In Campinas, Brazil, he noted certain metallic bees feeding at other tubular flowers, probably Bignoniaciae, in the same manner, attacking them at the base immediately, where there were one or more slits. A few other bees, among them a large species probably parasitic, entered the tubular corolla, but with what success he did not know.

Chiromyia (Scyphella) flava (Linn.). — Mr. Bryan exhibited two specimens of this yellow geomyzid fly, with the following note on its occurrence in Hawaii. In 1918 Mr. Giffard included this species in a list of "Samoan insects which also occur in Hawaii." (Proc. Haw. Ent. Soc., IV, p. 181.) A specimen was secured from Doctor Aldrich to compare with local material, and so far one specimen has been found, labeled Barber's Point, 12-23-23, O. H. Swezey. It happens, however, that the specimens from Samoa do not belong to this species, but are an undetermined species of Anthomyidae, which also occurs in Hawaii. This would indicate that *C. flava* is present in Hawaii, but not in Samoa. Concerning the specimen from the United States National Museum, Doctor Aldrich says: *"Chiromyia flava*

* Not available for publication.—Editor.

occurs only on windows, especially in damp places, such as basements. I obtained quite a series, including the one I am sending you, on laboratory windows at Friday Harbor, Washington, the building standing on piles over the edge of the ocean." Malloch gives a key to this and related species, Proc. Ent. Soc., Washington, V. 16, pp. 179-181, 1914. The species also occurs in Europe.

Gynandromorph Ant.—Mr. Swezey exhibited a specimen of ant found by him in a nest in the remains of a compost heap at the Experiment Station, Hawaiian Sugar Planters' Association, March 20, 1925. The left antenna of this specimen was that of a male, while the right antenna was that of a female. The species was apparently *Cardiocondyla nuda minutior* Forel.

Celerio perkinsi Sw. — A fine specimen of this rare native sphingid moth was exhibited by Mr. Swezey. He had reared it from a small caterpillar he had found on *Kadua* on Malamalama ridge, Oahu, February 8, 1925.

In rearing the caterpillar, it was fed mostly on leaves of *Straussia,* as they were more readily obtainable. The caterpillar pupated March 6, and the adult moth emerged March 30. The caterpillar stage was over a month, and the pupal stage twenty-four days.

Xyphidiopsis lita Heb. — Reporting on further experiments with this phasgonurid, Mr. Swezey stated that it ate tineid moths, *Gracilaria marginestrigata* Walsm., sixteen of them in twenty-four hours. It did not eat *Pseudococcus sacchari* much, but did eat extensively of *Cerataphis* when supplied. When fed with flowers of several kinds, it ate hibiscus corolla and stamens to a slight extent, and the corolla of *Bignonia venusta* slightly; but geranium flowers not at all. These observations seem to indicate that the insect is chiefly insectivorous. Two weeks before it died, twenty-seven eggs were laid loosely in the cotton plug closing the mouth of jar in which confined. The egg is flattish cylindrical, slightly over 2 mm. long, ends rounded and with a groove extending a short distance down one side, that from one end a little longer than the other; white, surface minutely roughened with very fine mosaic structure, as shown under microscope.

Meliphora grisella Fabr.—Two specimens of this bee moth were exhibited by Mr. Swezey, which he had reared from larvae found feeding on honeycomb in the cavity of a stump in a valley along the Firebreak Trail at the base of Mount Kaala, October 26, 1924. This had been a "bee tree" which had been robbed by someone previously. Some moths were about the fragments of comb left. A few of the larvae were found, and a piece of comb taken along for them to feed on. They seemed to require considerable time to mature, for the moths did not issue until March 24 and 30, respectively, five months after their capture.

Anastatus koebelei Ashm.—Mr. Swezey exhibited two specimens of this eupelmine reared respectively from eggs of *Celerio calida* Butl. and *Elimaea punctifera* Walk. The egg of *calida* was found on a leaf of *Scaevola chamissoniana* on a ridge in Manoa Valley, March 15, 1925. The parasite issued March 29. The egg of *Elimaea* was in a coconut leaf, and the parasite had issued on March 23. The parasite had been reared from the latter host a number of times, but it is thought that this is the first record of it from a sphingid egg.

Chrysopa lanata Banks.—Mr. Swezey reported having recently received this determination by Nathan Banks for this immigrant chrysopid, that has been known in the Islands since its first discovery by Mr. Timberlake, being reported by him at the November meeting, 1919. Mr. Banks gives its distribution as Peru, Chile, Argentina, and South Brazil. It was described by him from Argentina in 1910.

Engytatus geniculatus Reuter. — Mr. Swezey reported having obtained this name, determined by E. P. Van Duzee, for the small mirid bug which was discovered on tomato plants in August, 1924. Mr. Van Duzee stated that it occurred "from Florida to Texas and through Arizona to Southern California. Also in Sonora and Lower California." He had not taken it often, and had no records of its food plants. Apparently it is not to be feared as a new pest here. A few could always be found on tomato vines ever since their first discovery in August, but they have not been found on anything else yet.

Lepisma cincta Oudemans. — A very large silverfish was exhibited by Mr. Swezey. It was found by Mrs. Madden in

a box of carbon-paper sheets. It is larger than the common silverfish, more hairy, and of a darker slaty color with a white posterior band on the prothorax. Apparently the first time that the species has been noticed in Honolulu. It resembles a picture of *Lepisma cincta* in the Cambridge Natural History. It may turn out to be that species, described in 1890 from Java by Oudemans.

Insects on Board Ship at Sea.—Mr. Illingworth exhibited the following seven species of insects, captured on board the S.S. President Lincoln, during his voyage from Shanghai, September, 1924.

1. Blow-fly, *Chrysomyia megacephala* (Fabr.).
2. Grasshopper, *Atractomorpha ambigua* Bolivar.
3. American cockroach, *Periplaneta americana* (Linn.).
4. German cockroach, *Blatella germanica* (Linn.).
5. Cattle-fly, *Musca convexifrons* Thoms.
6. Preying mantid, undetermined.
7. Male moth, undetermined.

Mr. Illingworth stated that this is a vivid illustration of how such winged pests are constantly coming to us by the ships of commerce. Even the most stringent and efficient quarantine system availing little against such foes. They easily fly over the heads of boarding officers and land at any port of call. It will be noted, he said, that the first four species are already well established in Hawaii. Attention was called to the fact that the type locality for the grasshopper is Shanghai. Mr. Illingworth found it widely distributed in the Pacific, it being abundant in China, Japan, Australia, etc. He pointed out, further, that the fifth species is a very troublesome fly around stock, both in Queensland and the Orient. Though not a bloodsucker, it is particularly anoying to both man and beast, by its persistent attempt to get at the mucous membranes, especially around the eyes, nose, and mouth. Experimenting with this fly in Queensland, Mr. Illingworth found that it is a viviparous species, breeding normally in cow-dung.

Insects Taken in Quarantine.—Mr. Ehrhorn exhibited a parasite, reared from *Aspidiotus* sp. on ginger from the Philippines

found in baggage. He exhibited, also, some Hymenoptera * reared from galls on bamboo, used as brooms, from Japan. These brooms were dipped in corrosive sublimate for fungi, and fumigated with carbon bisulphide for insects.

Archytas sp.—Mr. Rosa exhibited several specimens of this tachinid fly, which was recently introduced from Mexico as a cutworm parasite. He stated that he had observed them in large numbers on milkweed plants around his residence.

MAY 7, 1925.

The 233rd meeting of the Hawaiian Etomological Society was held at 2:30 p. m. at the Hawaiian Sugar Planters' Association Experiment Station, President Williams presiding. Other members present were Messrs. Bryan, Crawford, Ehrhorn, Lutken, Muir, Rosa, Swezey, Willard, and Van Zwaluwenburg. Dr. A. D. Imms, in charge of Entomology at the Rothamsted Experiment Station at Harpenden, England, was a visitor.

The minutes of the April meeting were read and approved.

Doctor Imms was asked to make a few remarks. He outlined the founding and development of the Rothamsted Experiment Station, and gave a very interesting review of the entomological work being carried on there.

PAPER.

"Some Observations on the 'Silverfish' Lepisma Saccharina."

BY HELENE MORITA
University of Hawaii.
(Presented by D. L. Crawford.)

NOTES AND EXHIBITIONS.

Lyctus planicollis Leconte.—Mr. Willard exhibited specimens of this powder-post beetle taken by him in the United States

*These were later determined as *Aeolomorphus rhopaloides* Walker.—Editor.

Army warehouses at Schofield Barracks, April 16, 1925. He exhibited also hardwood tool-handles, which had been badly attacked by this beetle.

Orneodes objurgatella Walsm.—Mr. Swezey exhibited specimens of this moth reared from the seeds of *Plectronia odorata*. He had collected 136 fruits from a *Plectronia* tree at about 1000 feet elevation at Keawaula, toward the northwest point of Oahu, April 12. From these fruits, between April 20 and May 1, one hundred *Orneodes* moths had issued, showing a very high infestation. There had also issued six specimens of *Heterocrossa* sp. and one *Secodella metallica* (Ashm.), the latter being a parasite on one of the others.

Insects from Rotten Plumieria.—The following insects were reported as having been reared from rotten *Plumieria* stems by Mr. Swezey. On April 4, Mr. Giffard brought in half a dozen dead branches cut from his *Plumieria* trees. They were badly infested with larvae of a cerambycid beetle. From April 6 to May 6, a large number of insects issued from these branches where contained in a large glass jar. The following is the list:

Five *Lagocheirus obsoletus* Thoms.
Four *Lagocheirus obsoletus* pupae, remaining in branches.
Four *Lagocheirus obsoletus* larvae, remaining in branches.
Hundreds of a Mycetophillid.
Few Psychodids.
Two or three other Diptera.
Eight *Opogona aurisquamosa* (Butl.).
Nine *Opogona purpuriella* Sw.
One *Areocerus fasciculatus* (DeGeer).
Five *Dactylospermum abdominale* (Fab.).
Four small Staphylinids.
Numerous Acari on the *Lagocheirus* and *Dactylospermum* beetles.

Stenommatus musae Marshall.—Mr. Swezey reported having received a recent letter from Dr. G. A. K. Marshall in which was the following mention of this small banana weevil: "You will remember that in 1920 I described a species of *Stenommatus* which you found breeding in numbers in the root of a

banana plant. It may interest you to know that I recently received some Cossonids found in a similar position on bananas in South Africa. These bananas had been imported from Java. Five specimens were represented, four of which proved to be a new species of *Pentarthrum*, and the other was a specimen of *Stenommatus musae*. It seems, therefore, fairly certain that your insect must have been imported in bananas from the East."

JUNE 4, 1925.

The 234th meeting of the Hawaiian Entomological Society was held at 2:30 p. m. at the Experiment Station, Hawaiian Sugar Planters' Association. In the absence of president, vice-president, and secretary, Mr. Muir was selected to take the chair. Other members present were Messrs. Bryan, Crawford, Ehrhorn, Rosa, Swezey, and Van Zwaluwenburg. Mr. F. C. Hadden, a recent graduate in Entomology from the University of California, was a visitor.

Mr. Bryan was appointed to act as secretary. The minutes of the May meeting were read and approved.

Mr. Hadden, who had been president of the Entomology Club of the University of California, brought greetings from some of its members.

PAPER.

"Table for Distinguishing the Hawaiian Species of the Genus Dryophthorus of Curculionidae, Cossoninae (Coleoptera)."

BY O. H. SWEZEY.

NOTES AND EXHIBITIONS.

Thecla echion Linn.—A specimen of this butterfly was exhibited by Mr. Swezey, which he had reared from a larva found feeding on the green fruits of *Solanum nodiflorum* growing in a cane-field of Oahu Sugar Company, Waipahu, Oahu, May 11, 1925. This is one of the Lantana butterflies introduced from

Mexico in 1902. The larvae feed normally on Lantana flowers, but they have been found a few times feeding on fruits of the eggplant in gardens. This is the first record on the weed above mentioned.

Ilburnia leahi (Kirk.).—Mr. Swezey reported collecting this delphacid leafhopper on *Lipochaeta integrifolia* at Kaena Point, Oahu, May 31. This is the opposite extremity of the island from where it was first discovered, as it was described from Diamond Head (Leahi) by Kirkaldy, where he found it in 1904. This was the first species of Hawaiian Delphacidae described by Kirkaldy. Up to the present, 145 species and varieties have been described in this family.

Types of Tanager Expedition Coleoptera.—Mr. Bryan exhibited the type specimens of sixteen new species of Coleoptera collected in 1923 on the Tanager expeditions, and recently returned to the Bishop Museum by Doctor Perkins. He also read extracts from Doctor Perkins' paper, which will be published by the Bishop Museum as part of the report of the expeditions. The new species include twelve Rhyncophora, two Proterhinus, a Plagithmysus and a Cis, as follows:

Plagithmysus nihoae, Nihoa Island, on Euphorbia.
Dryotribus solitarius, Pearl and Hermes Reef.
Pentarthrum halodorum, Midway and Ocean Islands.
Pentarthrum pritchardiae, Nihoa Island, on Pritchardia.
Oodemas neckeri, Necker Island.
Oodemas breviscapum, Nihoa Island, on Euphorbia and bunch grass.
Oodemas erro, Nihoa Island, on Euphorbia.
Rhyncogonus exsul, Nihoa Island, on bunch grass.
Rhyncogonus biformis, Necker Island.
Rhyncogonus fallax, Wake Island, on a Tournefortia tree.
Sphaerorhinus pallescens, Wake Island.
Sphaerorhinus sordidus, Wake Island.
Acalles wilkesii, Wilkes Island (Wake Island), on Sida.
Proterhinus bryani, Nihoa Island, on Euphorbia.
Proterhinus abundans, Nihoa Island, on Euphorbia.
Cis vagans, Nihoa Island, on Euphorbia.

Among the specimens returned by Doctor Perkins is the type

of *Rhyncogonus bryani* Perkins, collected by W. A. Bryan on Laysan, and described in the Ent. Mo. Mag., 1919, p. 4. This unique specimen and the other types will be deposited in the Bishop Museum.

New Species of Lucilia.—Mr. Bryan exhibited a series of specimens of *Lucilia graphita* Shannon, a new species described for specimens found on Laysan Island, Pearl and Hermes Reef, Ocean Island, and Midway Island by the Tanager expeditions. It differs from all other species of Lucilia, in being very dark, almost the color of graphite. The description will be published in the report of the expeditions.

Discomyza maculipennis.—Mr. Bryan exhibited a series of this small black ephydrid fly, recently identified by Mr. E. T. Cresson, Jr. This is the first record in Hawaii of a species which is distributed from the East Indies to the West Indies. The species was recently bred in abundance from some improperly cleaned sea shells at the Bishop Museum, brought back from one of the Whippoorwill expeditions. Specimens had also been collected by Bridwell in Honolulu (no date; about 1917), and one specimen by Bryan, Oahu plantation, September 22, 1922.

Olfersia spinifera Leach.—Mr. Bryan exhibited a series of specimens of this hippoboscid parasite on frigate birds, which had been found in abundance on the islands visited by the Tanager expeditions, 1923. That it also occurs occasionally on the main islands of the Hawaiian group, is shown by a specimen collected at Puu Ka Pele, Kauai, September 4, 1920, by O. H. Swezey. This species was determined by Malloch. One other species, *O. arcuata* Speiser, is recorded in the Fauna Hawaiiensis from Hawaii, on frigate birds.

Itodacnus n. sp.—Mr. Bryan exhibited specimens of this elaterid beetle, which had been collected on Necker Island, 1923. He quoted Mr. Van Zwaluwenburg, who is working up the elateridae, as saying that this species is closely allied to species of this genus on Kauai, the larvae being almost indistinguishable.

After an informal discussion of the safeguarding of collections and reference libraries, the meeting adjourned at 3:45 p. m.

JULY 2, 1925.

The 235th meeting of the Hawaiian Entomological Society was held at the usual place, Vice-President Willard in the chair. Other members present were Messrs. Bryan, Crawford, Ehrhorn, Giffard, Illingworth, Lutken, Muir, and Swezey. Mr. H. S. Sharp was a visitor.

In the absence of the secretary, Mr. Bryan was appointed to fill that office. The minutes of the previous meeting were read and approved.

The name of Mr. F. C. Hadden was proposed for membership in the society.

Mr. Bryan presented the manuscript of an index to volume 5 of these proceedings.

NOTES AND EXHIBITIONS.

Engytatus geniculatus Reuter.—Mr. Swezey reported collecting this new immigrant bug on tomato-vines growing as a weed in cane-fields at Kahuku, June 26. This is the only place he had collected it since having first found it on tomato-vines in his garden in Manoa in August, 1924. It indicates that it is very widely spread on Oahu.

Lysiphlebus testacipes Cress.—Mr. Swezey reported the finding of *Aphis medicaginis* abundantly parasitized by this braconid on *Portulaca oleracea* in a cane-field at Waialua, June 26. This aphid parasite was introduced from California in February, 1923. It was abundantly spread about Honolulu, but none was liberated in the vicinity of Waialua. It has apparently become widely spread of itself during the two years since its introduction. It has been common on *Aphis maidis* on corn at both the Federal Experiment Station and University of Hawaii farm.

Head Capsules and Mouth-Parts.—Mr. Muir stated that he had been investigating the homologies of the head of Homoptera. He has concluded from these investigations that the sclerite known as the *lora* was the homolog of the *gena* and was not a part of the mandible, as stated by Smith and accepted by Comstock.

Monomorium pharaonis Linn.—Doctor Illingworth reported this

ant as bothering passengers in their bunks on board a passenger steamer on the trip over from Los Angeles. Mr. Ehrhorn stated that this ant is common on vessels, and is also a house ant in Hawaii. A discussion followed on the spread of insects by shipping. It was mentioned that, while the common house-fly of North America and Europe, *Musca domestica* Linn., is frequently abundant on vessels, it is seldom if ever captured in Honolulu. Our house-fly is the Oriental and Pacific species, *Musca vicina* Macquart. Attention was called to the abundance of flies in southern California.

AUGUST 6, 1925.

There being no quorum, no meeting was held.

SEPTEMBER 3, 1925.

The 236th meeting of the Hawaiian Entomological Society was held at the usual place, President F. X. Williams in the chair. Other members present were Messrs. Bryan, Giffard, Hadden, Illingworth, Swezey, and Van Zwaluwenburg. Miss Gertrude Henderson was a visitor.

The acting secretary was authorized to record that a meeting had been called for August 6, but adjourned for lack of a quorum.

Upon motion of Mr. Giffard, the rules were suspended and the acting secretary cast a unanimous ballot electing Mr. F. C. Hadden an active member.

PAPERS.

"Descriptions of New Species of the Dipterous Family Ephydridae from Hawaii."

BY E. T. CRESSON, JR.,
Academy of Natural Sciences, Philadelphia.

(Presented by E. H. Bryan, Jr.)

"Additional Notes on the Insects on Mauna Kea and Mauna Loa."

BY E. H. BRYAN, JR.,

NOTES AND EXHIBITIONS.

California Beetles.—Mr. Hadden exhibited a named collection of the larger beetles which he had collected in California.

Euscepes batatae Waterhouse.—Mr. Bryan exhibited a series of this weevil, and reported that he had found it very abundant in a number of sweet potatoes purchased at a local market. The sweet potatoes were riddled with holes, in which the grubs were abundant.

Hypothenemus ruficeps Perkins.—Mr. Van Zwaluwenburg reported that this scolytid was reared from a log of *Spondias* sp. brought in by Mr. McEldowney, August 19. This specimen agrees closely with one identified by Mr. Swezey, except that it has a dark suffusion on the posterior third of the pronotum.

Cyrtorhinus mundulus (Bredd.) — Mr. Van Zwaluwenburg stated that adults and nymphs of this bug were found in canefields at Hana, Maui, June 26. This is the first record of this species from eastern Maui.

Ammophorus insularis Boh.—Mr. Hadden reported that he and Mr. Swezey had captured specimens of this rare tenebrionid beetle under rocks and refuse on Ewa Coral Plain, September 2.

Sarcophaga plinthopyga Wd.—Doctor Illingworth stated that he had bred three specimens of this fly from maggots collected on dead fish near Makapuu Point last April. This is a new name for *S. robusta* Aldrich, the correction having been made by Doctor Aldrich after seeing Wiedemann's type. This species was first found in Hawaii by Doctor Illingworth in 1917 (Proc. Haw. Ent. Soc., III, p. 383), breeding in meat. He recently found it very abundant in southern California. It closely resembles our common large *Sarcophaga barbata,* but may be distinguished by the characters given in Mr. Timberlake's key (Proc. Haw. Ent. Soc., III, pp. 371-2). One other specimen was captured by Mr. Swezey in Kaimuki, March 14, 1921.

Ichneumonid.—Mr. Swezey exhibited two specimens of a new immigrant ichneumonid which issued from chrysalids of *Vanessa cardui*. The caterpillars of this butterfly were collected on a roadside weed on Mount Tantalus, July 4.

Holochlora japonica Brunn.—Mr. Swezey reported finding this large katydid in a cane-field of the Waialua Agricultural Company, July 15. It was near Kawaihapai, and is the farthest from Honolulu that the occurrence of this insect has been noted.

Engytatus geniculatus Reuter.—Mr. Swezey reported the finding of this bug on tomato-vines at Kailua, July 12, and at Ewa Plantation, July 3. This shows that the bug is very generally spread on Oahu, as it was previously reported from Manoa Valley and from Kahuku.

Archytas sp.—Mr. Swezey reported the capture of this Mexican tachinid in the forest of Opaeula, July 19, also on Olomana needle, July 12, thus indicating further the spread of this fly on Oahu. Mr. Williams stated that he had observed it feeding on Cyathodes at the southeast base of Mount Kaala, elevation about 1500 feet.

Omiodes blackburni (Butl.).—Mr. Swezey reported that the coconut leaves of palms on Kauai were in very perfect condition and not badly injured by this leaf-roller. Examination disclosed that the cocoons of *Cremastus hymeniae* were very numerous, and explains the condition of the leaves. Seventeen caterpillars were found on a palm at the Lihue Hotel. Of these, sixteen yielded the parasite *C. hymeniae*. Mr. Giffard stated that coconut palms on the Kona coast were also in fine foliage. Those at Honaunau, Napoopoo, and Kailua, formerly badly eaten, were now quite free from the marks of leaf-roller caterpillars.

Vespa occidentalis Cresson.—Mr. Swezey reported collecting this wasp in Olokele Canyon, Kauai, August 21. This is some distance from places of previous record on that island, it being very common in the Kokee region and between there and the Na Pali coast.

Maruca testulalis Geyer. — Mr. Swezey reported rearing this moth from string beans and lima beans at Waimea, Kauai, in August. This is the first record of its occurrence on that island.

Pseudococcus nipae (Mask.).—Mr. Swezey reported that this mealybug is becoming rare on avocados, figs, etc., on Kauai. This is no doubt due to the activity of its introduced parasite, *Pseudaphycus utilis* Timberlake. Mr. Giffard stated that the same was true on Hawaii.

OCTOBER 1, 1925.

The 237th meeting of the Hawaiian Entomological Society was held at the usual place. There being none of the officers present, Mr. Giffard was chosen to take the chair, and Mr. Bryan to act as secretary. Members present were Messrs. Bryan, Giffard, Hadden, Rosa, Swezey, and Van Zwaluwenburg. Miss Henderson was a visitor.

The minutes of the previous meeting were approved as amended.

NOTES AND EXHIBITIONS.

Canadian Butterflies.—Mr. Swezey exhibited several boxes of butterflies collected by him in Canada, around Banff and Mount Asiniboine, and a few also in California in 1922.

Plagithmysus New Species from Kauai.—A fine specimen of what appears to be a new species of Plagithmysus beetle was exhibited by Mr. Swezey. It had issued from a piece of dead branch of Pipturus tree collected at Kumuwe'a Ridge, Kauai, August 16, 1925.

Aphis maidis Notes.—Mr. Hadden reported his observation of the rapid rate of reproduction of this species of plant louse under favorable conditions. He found that one female would in twenty-six days produce 334 offspring, and that within fifteen days these were in turn ready to reproduce. If all lived, at this rate there would be ten billion descendants in three months and twenty-five billion in four months.

Lyctus sp.—Mr. Van Zwaluwenburg reported rearing a specimen of this powder-post beetle from a block of *Spondias* sp. grown on Vineyard Street, and brought in by Mr. McEldowney.

This was apparently the same species that was reared from an oak panel at Paia, Maui, by Mr. Swezey in 1918. Its numbers in this instance indicate its firm establishment on Oahu. [It was later determined by Doctor Van Dyke as *Lyctus linearis* (Goetze), a cosmopolitan species.—Ed.]

Tineola biselliela Hum.—Mr. Van Zwaluwenburg reported that a specimen of this tineid moth had been reared from a horsehair girth brought in by Doctor Lyon. This species does not make a case, but works within a loose web. It has been previously found eating brushes at the College of Hawaii by Doctor Illingworth, and was reared by Mr. Giffard from an old woolen hat at his bungalow at Twenty-nine Miles, Olaa, Hawaii, in 1923.

Paratenodera sinensis (Sauss).—Mr. Bryan exhibited a specimen of this Oriental preying mantis, which had been captured by Miss Carey D. Miller, of the University of Hawaii faculty, at her home in Manoa Valley, September 25. The specimen was inside the house, which is near the end of the Manoa car line, and its presence indicates that the descendants of the egg masses brought from Kohala by Mr. Swezey in June, 1922, have become well established. (See Proceedings, VI, p. 9, 1924.)

Formicaleo perjurus Walker.—Mr. Bryan exhibited a specimen of ant-lion captured by Mr. A. F. Judd at Kaupao on the dry west end of Molokai, July 18, 1925. It is the first record of an ant-lion on Molokai, and is probably *Formicaleo perjurus* Walker, but no description, or specimens, are available for making positive determination. *F. perjurus* was first collected on Oahu (Beechey expedition) and on Maui by Blackburn, hence this is quite likely to be the same species. Furthermore, the specimen is smaller than *F. wilsoni,* occurring commonly in certain dry regions on Hawaii, and it lacks the blackish clouding of the nervules which gives an irrorated appearance to the forewings of *wilsoni.* Both of these characters are mentioned by McLachlan in comparing the two species when he described *wilsoni.* (See Ann. Mag. Nat. Hist. (6), X, p. 179, 1892.)

Genitalia of Hawaiian Plagithmysides.—Mr. Giffard reported that, during a study of certain species of the cerambycid group Plagithmysides, the dissection of the male genitalia of remote

species in each of the genera Plagithmysus, Clytarlus, and Callithmysus, indicated that the characters in each were identical, or at most, if any slight difference at all, it was unimportant. The species dissected were, as follows:

One *Plagithmysus darwinianus* Shp., Kilauea, Hawaii, 4000 feet elevation.

One *Plagithmysus aequalis* Shp., Waimea Mountains, Kauai, 4000 feet elevation.

One *Plagithmysus pulverulentus* Motsch., Tantalus, Oahu, 1500 feet.

One *Clytarlus pennatus* Sharp, slopes Haleakala, Maui, high elevation.

One *Callithmysus cristatus* Sharp, Tantalus, Oahu, 1500 feet elevation.

Each of the above species is confined to the island specified.

The remainder of the meeting was devoted to a discussion of the features of Plagithmysus, and the distribution and habits of this and other endemic forest insects.

NOVEMBER 5, 1925.

The 238th meeting of the Hawaiian Entomological Society was held at the usual place. There were present Messrs. Hadden, Willard, Van Zwaluwenburg, Giffard, Muir, Swezey, Rosa, Williams, Bryan, Crawford, Illingworth and Fullaway, members; and Miss Henderson, visitor.

The minutes of the previous meeting were read and approved with corrections.

A vote of thanks to the trustees of the Hawaiian Sugar Planters' Association for printing 1924 Proceedings was moved, duly seconded and carried.

Mr. Irwin Spalding was proposed for membership by Mr. Giffard, and seconded by Mr. Muir.

PAPERS.

"Mango Weevil—Correction of Name."

BY O. H. SWEZEY.

"Kilauea Moths."

BY O. H. SWEZEY.

NOTES AND EXHIBITIONS.

Monocrepidius exsul Shp.—Mr. Van Zwaluwenburg recorded the collection of a larva of *Monocrepidius* on Eastern Island, Midway, by Tanager expedition. Presumably the form present is *M. exsul.*

Egg-Sucking Habit of Heteroptera.—Mr. Muir recorded Mr. Pemberton's observation in the Philippine Islands of egg-sucking bugs in connection with weevils.

Ataenius inops Horn.—Mr. Swezey exhibited a specimen of this aphodiid beetle which had been collected from soil containing a good deal of decaying vegetable matter at Honolulu, May 15, 1924. Apparently this beetle has not been previously recorded here. At the Bishop Museum are two specimens collected by Bridwell, Honolulu, 1917, without reference to habitat.

Dryophthorus pusillus Shp.—Mr. Swezey exhibited a specimen of this cossonid weevil collected by Mr. Williams in a dead stem of Cibotium in Kohala, Hawaii, September 28, 1925. The species is common in the tree-ferns of Mount Tantalus, Oahu, and this is the first record of it from another island. In the Fauna Hawaiiensis it is recorded as collected by Blackburn on Oahu "in stems of the tree-fern." Doctor Perkins remarked that he had never met with the species. Later, he became familiar with it on Tantalus, where it was also collected by Mr. Giffard.

Tineola uterella Walsm.—Mr. Swezey reported that in an examination of a lot of seventy-nine larval cases of this tineid moth collected in basement of the experiment station building, 70 per cent had been parasitized, as revealed by the presence of the white cocoons of the parasite inside the cases. All had previ-

ously issued, both the moth and its parasite, *Protapanteles hawaiiensis* Ashm., except that two of the cases contained larvae of the moth. An examination of fifty larval cases collected in the basement of his house in Manoa showed 58 per cent had been parasitized.

Spalangia cameroni Perkins. — Mr. Swezey reported having reared seventeen of this parasite from fifty-three puparia of the horn-fly collected at Gilbert, Oahu, September 2, 1925. This is equivalent to 32 per cent parasitization, and was rather unexpected, as it is such a dry region and very hot at the time, and seemed very unfavorable for parasites of any kind. One of the same parasites issued from a puparium of *Limnophora arcuata* Stein, an anthomyid, collected in cow-dung along with the horn-fly puparia.

Microbracon pembertoni, a Synonym of M. mellitor Say.— Mr. Willard called attention to the fact that this braconid was considered a new species in 1918, when it was described by J. C. Bridwell and named *Microbracon pembertoni.* (Proc. Haw. Ent. Soc., IV, No. 1, p. 115, 1919.) C. W. F. Musebeck, in "A Revision of Parasitic Wasps of the Genus Microbracon Occurring in America, North of Mexico" (Proc. U. S. Nat. Museum, 67, No. 2580, p. 65, 1925), after comparing paratypes of *pembertoni* in the United States National Museum with Say's description of *mellitor* in 1836, considers *pembertoni* a synonym of *mellitor.*

The Stimulus of Microbracon mellitor to Attack and Oviposition.—While studying the life history of this parasite, Mr. Willard found that the stimulus to attack its host and oviposit occurred only when the host larva was enclosed by some covering. In nature, the caterpillar of the pink bollworm, *Pectinophora gossypiella* Saunders, is stung and oviposition occurs while it is within the cotton boll. In the laboratory also, attack and oviposition upon caterpillars within bolls was secured without difficulty; but no notice was taken of caterpillars that had been removed from the bolls and allowed to crawl about in the parasite cages. Oviposition was readily secured by enclosing a caterpillar in a gelatin capsule about one-half inch long, such as physicians use for administering powders, and which had been perforated

in several places by a needle-point. When a larva enclosed in this manner was placed in a cage with gravid females, the stimulus was immediately evident. A female would soon locate one of the perforations, through which it would sting and paralyze the larva. That the stimulus was due to a moving larva within a covering, is further indicated by the fact that *M. mellitor* readily stung, and oviposited upon, maggots of the melon-fly *Bactrocera cucurbitae* (Coq.), which were similarly placed in gelatin capsules. The poison injected by the parasite killed instead of paralyzing the maggots, which soon began to decompose, and the larvae which hatched from the parasite eggs could not develop. The stimulus to attack was also shown in the case of the larvae of the Mediterranean fruit-fly, *Ceratitis capitata* Wied., in fruits of *Mimusops elengi*. One of these fruits, the skin of which had been perforated with a needle, and which contained nine *C. capitata* larvae, was placed in a cage with female *M. mellitor*. Within two hours all the maggots had been stung and killed; but no eggs were found in the fruit.

By using transparent gelatin capsules, as previously described, and glass sterilizing tubes as parasite cages, the process of stinging, paralyzation and oviposition was clearly visible through a binocular microscope. When a perforation in the capsule was located, the parasite inserted its ovipositor rather cautiously until it came in contact with the caterpillar. The ovipositor was then given a quick thrust, and immediately withdrawn. During the fraction of a second required for the thrust, the skin of the caterpillar was pierced and enough poison injected to cause paralyzation. After the ovipositor was withdrawn, the parasite rested several minutes and again inserted the ovipositor, pricking the caterpillar several times to ascertain the degree of paralyzation. As soon as the larva became quiet, an egg was deposited upon it.

Mating of Parisierola emigrata Rohwer. — Mr. Willard submitted the following note on the mating habits of this bethylid. Mating occurs within the cocoons, which are spun by the mature larva near the remains of the host caterpillar, and in which the pupa stage is passed. The males in each group of cocoons emerge from one to two days before the females. The proportion of males to females is about one to four. The males gain access

to the females by biting holes in the cocoons through which they enter. These holes serve as emergence holes for the females subsequent to mating. Large numbers of adults were under observation, but no attempts to mate were observed after the females had emerged. Many instances of mating within the cocoon of the female were distinctly seen through the binocular microscope.

Lycaenid Larva Attacking Litchi in Hong Kong.—Mr. Fullaway exhibited specimens of the lycaenid butterfly *Deudorix epijarbas* Moore reared from larvae found destroying the fruits of the litchi in Hong Kong.

California Cerambycidae.—Mr. Hadden exhibited a collection of California Cerambycidae made previous to his return to the Islands in 1925.

DECEMBER 3, 1925.

The 239th regular meeting of the Hawaiian Entomological Society was held at the Experiment Station of the Hawaiian Sugar Planters' Association at 2:30 p. m., President F. X. Williams presiding. Other members present were Messrs. Bryan, Ehrhorn, Giffard, Hadden, Muir, Rosa, Swezey, Van Zwaluwenburg, and Willard. Miss G. Henderson was a visitor.

In the absence of the secretary, Mr. Willard was appointed secretary pro tem.

Owing to the illness of the secretary, the minutes of the previous meeting were not at hand.

Mr. Irwin Spalding was unanimously elected an active member of the society.

The following officers were unanimously elected for the year 1926: President, H. F. Willard; Vice-President, R. H. Van Zwaluwenburg; Secretary-Treasurer, E. H. Bryan, Jr.

Executive Committee: W. M. Giffard, F. Muir.

Mr. Muir reported that an effort was being made by the Pan-Pacific Union to have Honolulu made the 1928 meeting place of the International Entomological Congress. He remarked that

the entomologists of Honolulu had met at the Pan-Pacific Research Institute and heartily endorsed this effort. The Pan-Pacific Union appointed the following committee to work toward obtaining this meeting for Honolulu: F. Muir, W. M. Giffard, and D. L. Crawford. Mr. Muir stated that the Pan-Pacific Union had sent word to Dr. L. O. Howard, asking him to put the matter before the entomological section of the American Association for the Advancement of Science at their meeting in Kansas City in December, 1925, asking him to advise the members of the section of the attitude of the Pan-Pacific Union and the entomologists of Honolulu, and urgently request that the meeting be held here in 1928.

Upon motion by Mr. Giffard, it was voted that the Executive Committee draft appropriate resolutions strongly endorsing the above effort by the Hawaiian Entomological Society, and that a copy of these resolutions be forwarded to the Pan-Pacific Union, and one be embodied in the minutes of the society.

ADDRESS OF THE RETIRING PRESIDENT

"Some Spider Wasps of the Family Psammocharidae or Pompilidae." *

BY DR. F. X. WILLIAMS.

PAPERS.

"Notes on Hawaiian Orthoptera."

BY MORGAN HEBARD.

(Presented by E. H. Bryan, Jr.)

"New Hawaiian Chalcid-Flies."

BY P. H. TIMBERLAKE.

(Presented by title by O. H. Swezey.)

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* This paper is not published herewith, as it is embodied in an entomological bulletin to be issued soon by the Experiment Station, Hawaiian Sugar Planters' Association.—Editor.

"A New Species of Fruit-fly Parasite from Formosa (Braconidae)."

BY D. T. FULLAWAY.

(Presented by title by H. F. Willard.)

"Arrenophagus Albipes Girault in Hawaii."

BY O. H. SWEZEY.

"Casinaria Infesta (Cress.) in Hawaii." *

BY O. H. SWEZEY.

"Some Remarks on Dr. Hem Singh-Pruthi's Paper on the Morphology of the Male Genitalia in Rhynchota."

BY F. MUIR.

NOTES AND EXHIBITIONS.

Latrodectes mactans Fabr. — Mr. Hadden reported taking a specimen of this spider, called the hourglass spider, black widow, or shoe-button spider, on the lower slopes of Koko Head, November 25, 1925. The spider had utilized a hole in the ground and some of the surrounding brush to make a nest in. When first seen it was clinging upside down near the mouth of the funnel of its web, so that the red hourglass on its abdomen could be plainly seen. When found it was feeding on the larva of *Spodoptera maurita*. Reference: W. B. Herms' "Medical and Veterinary Entomology, 1923."

Stictocephala festina (Say). — Specimens of this membracid, which were taken at Kahala (Waialae Ranch) on November 13, 1924, were exhibited by Mr. Hadden. Mr. Bryan reported it

*In connection with this paper, Mr. Swezey exhibited also a closely related species which he had reared from cocoons found at Waialae Ranch, Oahu, October 28, 1925, the first observance of this new immigrant in Hawaii. Specimens were sent later to the United States Bureau of Entomology, Washington, D. C., where Mr. Cushman identified them as *Hyposoter exiguae* (Vier.), originally described from California.—Editor.

having been taken on the University of Hawaii grounds by students. It is found here on alfalfa and grasses, and is probably a new immigrant from California, brought here on hay. It is found in California, Mexico, Arizona, Texas, Colorado, Pennsylvania, and throughout the southern states and in the West Indies.

Phloebius sp.—Mr. Bryan reported that a specimen of anthribid beetle, which had been collected by Mr. Bissell on a window of the Vida Villa Hotel, Honolulu, January, 1923 (see Proc. Haw. Ent. Soc., V, 5, p. 344), had been sent to Mr. A. M. Lea of Adelaide, South Australia, for determination. Mr. Lea had returned the specimen with the following note: "We have nothing exactly like it in our collections, but it would be hardly good enough to name a single specimen so close structurally to *P. gigas*, of which I send sexes for comparison." *Phloebius gigas* Fabr. is a fairly common species in Queensland. The immigrant found in Honolulu is a very closely allied species.

Aphelinus maidis Timb.—Mr. Swezey reported as follows on the hyperparasitism of this aphid parasite by *Aphidenencyrtus schizoneurae* Ashm.: *Aphis sacchari* at Experiment Station, Hawaiian Sugar Planters' Association February 16, 1925, 99 per cent hyperparasitized; ditto, March 6, 98 per cent. *Aphis maidis* at Makiki nursery, June 17, 1925, 56 per cent; ditto, June 29, 40 per cent. *Aphis sacchari* at Waialua, October 9, 1925, 54 per cent. *Aphis maidis* at Hind-Clarke dairy, Wailupe, November 13, 1925, 60 per cent.

Melittobia hawaiiensis Perk. — Mr. Swezey reported rearing this eulophid from a Megachile nest collected at Waimea, Kauai, August 8, 1925. The Megachile nest was in the groove of a tongue-and-groove board in a lumber-pile. There were seventeen cells in the nest, and Melittobia issued abundantly from fifteen of the cells; the other two contained dead larvae. This equals 88 per cent parasitization, and indicates a strong check on the Megachile. The species of the latter was probably *timberlakei* Cockerell. Both it and *palmarum* Perk. are known to occur there. The nest appeared to be of the former, however, although no bees issued from the nest.

Spodoptera mauritia (Boisd.) — Mr. Swezey reported having found an extra large cluster of eggs of this moth on a grass-leaf, and on counting them, found there were 586 in the cluster.

Pseudococcus boninsis (Kuwana).—Mr. Ehrhorn called attention to a paper by Mr. Harold Morrison, on the "Identity of the Mealy Bug Described as *Dactylopius calceolariae* Maskell" which was published in the September 1, 1925, issue of the Journal of Agricultural Research. In this paper it is pointed out that the gray sugar-cane mealybug, which has been identified by many as *Pseudococcus calceolariae,* is not *calceolariae* at all, but *Pseudococcus boninsis* (Kuwana), which was described from sugar-cane from the Bonin Islands by Kuwana in 1909. Reference: Jour. N. Y. Ent. Soc., 17, p. 161, 1909.

Death of Dr. Maxwell Lefroy.—Mr. Swezey called attention to the recent death of Professor Maxwell Lefroy, and read a newspaper clipping from a London paper which described the circumstances surrounding his death.

Observations on Chrysomyia Megacephala (Fabr.), Our Common Blow-Fly, in the Orient.

BY J. F. ILLINGWORTH.

(Presented at the meeting of January 8, 1925.)

As I have already reported, I was interested to find that this subtropical Indian species had extended as far north as Japan. Yet it was very rarely seen in the vicinity of Yokohama, the climate evidently fixing this as the northern limit.

In Central China, on the other hand, I found this species to be the predominant fly in the valley of the Yangtze. It is the one against which all the fly campaigns of that thickly populated region are waged. Strange to relate, however, this species there shows a remarkable adaptation to man's habits of living. It is a common custom in Central and Southern China to conserve all human excrement in liquid form for use on the garden crops. This is stored in nooks and corners along the narrow streets, in large "kongs" (jars) about four feet across the tops. The fermenting mass "smells to heaven," being worse if anything than carrion, hence these flies have gradually become accustomed to breeding in it. The whole surface of the mass in each kong, during the summer, is packed with writhing maggots—not room enough for another one to get in edgewise. The jars are so constructed, however, that the maggots cannot crawl out when fully fed, due to a rim at the top. Nevertheless, the farmers and gardeners do just what is best to insure the breeding of the flies, for they dip out the top layer, from day to day, spreading it as fertilizer on the soil. The larvae then dig in and pupate contentedly, emerging in a few days to contaminate the foods, etc.

It is now generally recognized that the adults are very fond of sweets, and these substances are used in most of the fly-traps for baiting them. Foods exposed for sale in all of the small stalls along the narrow streets are covered with swarms of these blue flies. Hence it is not difficult to understand why such diseases as amoebic dysentery, typhoid, etc., are so prevalent there. The filthy habit, too, of spitting, so common in China, is attractive to these flies. You see them everywhere in the streets, feed-

ing on the sputum on the ground. Going from this straight to exposed food, or to the sticky mouths of children, it is not difficult to understand why tuberculosis is so widespread in China.

The missionaries at Soochow, in their attempt to check the flies early in the season while few in number, offered ten coppers per hundred. The thrifty Chinese, however, began bringing them in in enormous numbers. This led to an investigation, and it was found that some individuals, who had been specializing in breeding the maggots for duck feed, decided that it was far more profitable to rear the adult flies, selling them to the rich foreigners.

At Nanking the fly campaign was rather effective, though also expensive. There they used cyanide of potassium by the ton, under the direction of Professor Woodworth. Fifty of the native city police were delegated by the Governor to place a small amount of the poison in each exposed kong in the city, every few days. Just enough of the cyanide solution was used in each case to stop the activities of the writhing mass of maggots on the surface at each receptacle. This treatment cost the city, for the chemical alone, about 5000 Mexican dollars in 1923. Due to the exigencies of civil war, this appropriation was not supplied in 1924, and the blow-flies became distressingly abundant again.

HAWAIIAN REFERENCES TO *Chrysomyia megacephala* (Fabr.).

1907. Van Dine, Rpt. Haw. Agr. Exp. Sta., p. 47. (*Calliphora dux.*) Injurious blow-fly of sheep.

1907. Van Dine, Fifth Proc. Haw. Livestock Breeders' Assn., pp. 45-64. (*Calliphora dux.*) Full discussion of this sheep pest.

1908. Van Dine, Rpt. Haw. Agr. Exp. Sta., pp. 21, 36. (*Calliphora dux*). Discussed as the sheep maggot-fly.

1909. Terry, Proc. Haw. Ent. Soc., II, p. 91. (*Lucilia dux* Esch.). Observed as a carrion feeder in South China.

1916. Kuhns, Proc. Ent. Soc., III, p. 267. (*Lucilia dux.*) Reared from maggots on the beach.

1916. Swezey, Proc. Haw. Ent. Soc., III, p. 272. (*Chrysomyia dux* (Esch.) as determined by Knab.)

1917. Illingworth, Proc. Haw. Ent. Soc., III, p. 429. (*Chrysomyia dux.*) Referred to as the sheep maggot-fly of Hawaii.

1918. Bridwell, Trans. Med. Soc. Haw., 1916-17, p. 31. (*Pycnosoma dux.*) Carrion breeder which contaminates foods.

1922. Fullaway, Proc. Haw. Ent. Soc., V, p. 12. (*Chrysomyia dux.*) Collected at Waimea, Hawaii.

1923. Bryan, Proc. Haw. Ent. Soc., V, p. 193. (*Chrysomyia dux* Esch.) Exhibited specimen taken near Sydney.

1923. Illingworth, Proc. Haw. Ent. Soc., V, pp. 266-7. (*Chrysomyia megacephala* (Fabr.)). Synonymy, and notes on distribution.

1923. Illingworth, Proc. Haw. Ent. Soc., V, p. 277. Collected on shrubbery at Parker Ranch, Hawaii.

1923. Illingworth, Proc. Haw. Ent. Soc., V, p. 280. Breeding in carrion, Honolulu.

1924. Illingworth, Proc. Haw. Ent. Soc., V, p. 377. (*Chrysomyia megacephala* (Fabr.)) Further notes on distribution in the Orient.

The Genus Popillia with Its Natural Enemies in the Orient (Col.).

BY J. F. ILLINGWORTH.

(Presented at the meeting of February 5, 1925.)

In this paper I wish to briefly review the work as carried on in the Orient by the United States Department of Agriculture in their search for natural enemies of *Popillia japonica* Newm. Though this species is evidently confined to Japan, the Genus Popillia is widely distributed. Recorded species are very numerous, being in their order of abundance from India, China, Korea, Africa, Japan, Mexico, Manchuria, etc.

Clausen and King (1924)* have already given an excellent preliminary report on the work accomplished in Japan and Korea. The exceedingly effective tachinid parasite which they found in northern Japan was named *Centeter cinerea* by Doctor Aldrich (1923). This fly practically wipes out the beetles during the years of their abundance, i. e., alternate years, parasitizing more than 99 per cent of the females. The eggs are firmly glued to the dorsum of the thorax. Hatching, the maggots at once make their way through the hard chitin, quickly putting an end to the activities of the beetle. Since the maggot devours most of the internal anatomy, the host dies in about five days. The maggot then pupates within the empty, hard shell of the beetle, which makes it very convenient for handling and shipping them during their long dormant period. They do not emerge as flies until the following spring.

Hundreds of thousands of these parasitized beetles have been collected in northern Japan, and shipped to the laboratory at Riverton, New Jersey, where the issuing flies were liberated. A few parasitized beetles were found in the field near Riverton during the summer of 1923, as reported by Mr. Smith (1924). The past season (1924) gave further very encouraging evidence, for Mr. Smith wrote that beetles with eggs attached to the thorax had been collected in considerable numbers and over a wide area, far removed from the point of original liberations of the flies.

Proc. Haw. Ent. Soc., VI, No. 2, July, 1926.

* Figures in parentheses refer to bibliography.

Another, though less effective parasite of the adult beetles, is the yellow tachinid, found at Yokohama. Doctor Aldrich (1923) determined this as *Ochromeigenia ormioides* Towns. This fly is a most elusive creature. It is active only at night. We experienced the greatest difficulty in trying to learn something of its habits, and were unable to discover just how it parasitized the beetles. For this investigation we built a large screen cage, covering native food-plants of the beetles. In this we were able to observe that the flies remained absolutely motionless during the day, sitting wherever they chanced to be, either on the foliage, or on the screening of the walls. As soon as dusk approached, however, they became exceedingly active, running around the beetles and touching them with their antennae. Where the beetles were on the screen sides of the cage, the activities of the flies could be more easily followed in the semidarkness by getting down, so as to use the sky as a background. Under such conditions, I could see that the fly, with ovipositor extended and curved forward, ran quickly over the back of the beetle. This insect evidently was fully alive to its danger, for it remonstrated vigorously by kicking its hind legs over its back. The movement of the parasite was so rapid, however, and the light so poor, that I was unable to make out just when parasitism took place. At any rate, nothing was left on the surface of the beetle, for I examined such specimens by lamplight. Yet flies developed later from these beetles, demonstrating that the act had been accomplished.

Dissection of these yellow flies showed that they are viviparous—the eggs hatched within their body—so they evidently deposit the active larva upon the beetle. Hence, we may conclude that the maggot is possibly tucked under the wing covers, which are slightly raised during the struggle of the beetle to free itself of the troublesome parasite. At any rate, the maggot is quickly at work eating out the vitals of the host. Under most favorable field conditions, in the vicinity of Yokohama, about 35 per cent of the pest succumbed to this parasite.

Japanese parasites of the grubs of Popillia, so far discovered, are not as promising as the above. These are scoliid wasps belonging to the Genus Tiphia, and a dexiid fly (*Prosena siberita* Fabr.). This latter insect was exceedingly abundant in many

parts of Hokkaido during August, 1923, when making a hurried scouting trip of that island. On this trip we found the Popillia beetles very scarce, but these natural enemies of the grubs were much in evidence. At Piuka, in northern Hokkaido, we also found scoliid wasps, belonging to the Genus Campsomeris, swarming over grub-infested soil along a railway embankment. Yet we were not able to devote sufficient time to digging to determine whether they were using Popillia for a host or not.

Both Tiphia and Campsomeris wasps were found also in Korea, parasitizing the grubs of related Popillia and Anomala beetles. A second species of dexiid was also found there breeding on these grubs.

In November, 1923, I went over to China to make a study of the natural enemies of the related species of Popillia, which are rather abundant in that country. The fact that these beetles are so prolific there would suggest that parasites are few in the country. In the valley of the Yangtze River we found the following, named in the order of abundance: *Popillia atrocoerulea* Bates, *P. indigonacea* Mots., *P. cyanae* Hope, and *P. quadriguttata* Fabr. We hired collectors to bring these in by the tens of thousands. Each individual beetle was examined for external parasites, and, furthermore, all those that died within a week after collecting were kept. From all of these, only two parasites emerged, and they were the yellow tachinids, like we found at Yokohama.

Farther south, at Foochow, *P. cyanae* and *P. quadriguttata* were the very abundant species, while we got a few of the subtropical *P. marginicollis* Hope. Here, again, no parasites of the adult beetles were discovered. Toads and other predators, however, were much in evidence, feeding on this easily procured food.

Scoliid wasps are considerably in evidence in China. At least three species of these were reared on Popillia grubs at our stations at Chinkiang, Nanking, and Hangchow. At the first of the above stations we bred out a species of Campsomeris wasp, but the life-cycle was so short that it could pass through several generations each season. Hence, it would probably require several hosts. A small species of Tiphia was fairly common, and very peculiar in that it deposited a black egg on the venter, just

behind the legs of the paralyzed grub. A larger Tiphia placed a white egg on the dorsum of the thorax of its host. These two most promising species were bred out in considerable numbers, the cocoons being easily forwarded to Riverton for liberation.

During this work in the Orient since its inception in 1920, more than a dozen true insect parasites of the Genus Popillia have been found. Several of them have been shipped in considerable numbers to the New Jersey laboratory. Great hopes are based upon the known efficiency of the tachinid, *Centeter cinerea* Ald. Yet the investigation is now being extended as far as India, and will be kept up until such time as the pest ceases to be a menace in the infested region of the eastern United States.

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The Common Muscoid Flies, Occurring About Sweet-Shops in Yokohama, Japan.

BY J. F. ILLINGWORTH.

(Presented at the meeting of February 5, 1925.)

Stationed in Yokohama during June and July, 1923, I was interested in the swarms of flies congregated in shops where various sweets, wines, etc., were exposed for sale. In such places an attempt was being made to check these pests, using a most ingenious fly-trap. Finding that I could get quantities of specimens so easily, I decided to make a census of the comparative abundance of the species thus attracted to sweets.

From five traps, June 28 I got 163 flies. These were each examined with a lens, and separated into the following species:

		Per cent
Lucilia caesar (Linn.)	76	47.0
Calliphora lata Coq.	35	21.5
Muscina stabulans (Fall.)	24	15.0
Fannia scalaris (Fabr.)	15	9.0
Sarcophaga fuscicauda Böttch.	5	3.0
Lucilia sericata (Meigen)	4	2.5
Fannia canicularis (Linn.)	2	1.0
Musca convexifrons Thoms.	1	.5
Ophyra nigra (Weidemann)	1	.5
	163	100.0

It is interesting to note that not a single house-fly, *Musca domestica,* was taken in the above lot of flies. Indeed, I found this species remarkably scarce, even later in the summer, when other flies were very prolific. This is probably accounted for by the lack of favorable facilities for breeding. As is well known, Japanese cities have very few draught animals. Furthermore, even the little available manure from these creatures is at once put into maceration tanks, together with human excrement and other organic matter. In the treatment of this fertilizer material, it is so saturated that *domestica* has apparently not yet become sufficiently adapted to live in it. All of the other species listed above, however, I was able to breed out under such

conditions. They apparently live happily, side by side, in such a foul-smelling semiliquid, fermenting mass.

A month later, July 28, all of these species of flies had become increasingly abundant. Going over the 5250 taken from the traps, I got the following records:

		Per cent
Calliphora lata Coq.	1765	33.62
Sarcophaga (mostly *fuscicauda* Bötteh.)	1156	22.00
Lucilia cæsar (Linn.)	809	15.40
Lucilia sericata (Meigen)	752	14.34
Muscina stabulans (Fall.)	283	5.38
Fannia scalaris (Fabr.)	256	4.88
Musca domestica Linn.	122	2.33
Fannia canicularis (Linn.)	72	1.37
Ophyra nigra (Weid.)	13	.25
Chrysomyia megacephala (Fabr.)	4	.08
Anthomyia bisetosa Thoms.	3	.06
Musca convexifrons Thoms.	2	.04
Chrysomyia sp. n.	1	.02
Miscellaneous small flies	12	.23
	5250	100.00

The above data goes to show that the danger to public health from such flies can hardly be overestimated. Breeding as they do in the Orient, under the most filthy conditions, frequently contaminated by disease germs of typhoid, etc., in human excrement, they come straight to the food of man. Of course it is well known that, in feeding, these flies must first liquefy the food before they can take it into their bodies. Watching a fly feeding on a dry piece of sugar or candy, one gets a vivid illustration of this. It first regurgitates a drop of contaminated liquid from its crop, which, by the way, is located away down in its abdomen. This liquid is at once applied to the dry surface of the sugar and rubbed about vigorously with the rasplike flabellum on the end of the fly's proboscis. The solution is then sucked in and forced out several times in a churning process before it is finally swallowed. Inevitably a part of the contaminated, germ-laden liquid is left on the surface of the sugar. Likewise, the same process takes place when we see the flies feeding at the corners of the sticky mouths of children. Hence it is not difficult to understand the tremendous mortality, especially among the young, in summer in the Orient.

Notes on Sarcophaga Fuscicauda Böttcher (Diptera).

BY J. F. ILLINGWORTH.

(Presented at the meeting of April 2, 1925.)

This subtropical species has been known in Hawaii for about twenty years, until recently going under the label "Sarcophaga sp." When I went to North Queensland in 1917 I again found it. In the warm humid districts along the coast of that state it is a particularly troublesome species, for it apparently is as closely associated with man there as even the house-fly itself.

Though it is an omnivorous feeder, breeding in almost any form of organic matter, it evidently favors human excrement. While located in the Cairns district, I bred out thousands of maggots from outdoor toilets, and found practically all of them belonged to this species. It was also a distressing pest about the insectary, frequently getting its maggots into the jars of parasitized beetles, and thus upsetting calculations.

Because of its extreme economic importance, I sent specimens from my Queensland laboratory to Dr. R. R. Parker for determination. November 14, 1918, he wrote that this species was *Sarcophaga fuscicauda* Böttcher. Mr. Timberlake later sent specimens from Honolulu to Doctor Parker for determination. These were referred to the same species. (See Proc. Haw. Ent. Soc., Vol. 4, p. 256, March 6, 1919.)

Doctor Parker wrote me December 11, 1922, referring to a recent paper, which I had sent him, by Johnston and Tiegs on the Sarcophagid flies of Queensland. Regarding the above species, he remarked:

"If Johnston's determination of *Sarcophaga irrequieta* Walker is correct, then *fuscicauda* Böttcher is synonymous."

Thinking that we might be able to clear up the confusion in this, the name of one of our most important economic species, I wrote to Doctor Marshall of the British Museum January 30, 1925, as follows:

"I am wondering if you cannot help us straighten out the name of one of our tropical species of sarcophagids. We have known

this fly for some time in Hawaii, and Mr. Timberlake included it in his "Key to Separate Hawaiian Sarcophaga" (see Proc. Haw. Ent. Soc., Vol. 3, p. 371, typed copy enclosed) as Sarcophaga sp. Later, Dr. R. R. Parker determined the species for me as *S. fuscicauda* Böttcher. I found these flies abundant about habitations in North Queensland.

"When Johnston and Tiegs worked the Queensland sarcophagids (see Proc. Roy. Soc. Qsld., Vol. 33, pp. 46-90), they decided that this was Walker's species *S. irrequieta* (1849). We do not have access to Walker's list, but I understand that his type is a female specimen, which is now in the British Museum.

"Since our species is so widely spread in the Pacific, and everywhere so closely associated with man, it is important to get it correctly determined.

"Using Timberlake's key, I believe it will be possible, even though Walker's type is a female, to clear this matter up.

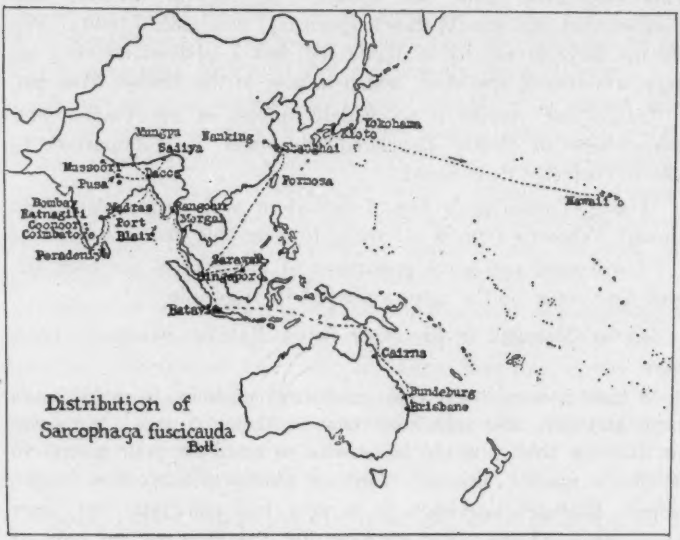
"I will send you some specimens of our species for comparison, also some of the same collected in Australia."

Doctor Marshall in his reply dated 26th of February, 1925, says:

"I have now carefully compared your specimens with Walker's type, and have also submitted them to Major Austen. We agree in thinking that it would be unwise to attribute your insects to Walker's species, although they are evidently extremely closely allied. Walker's specimen is in very bad condition, but there is no trace of any scars representing the intermediate pair of prescutellar bristles, and the front is undoubtedly broader in Walker's specimen than in any of your females. It will be difficult to clear up the exact identity of *S. irrequieta* until we have been able to obtain both males and females from the same locality in western Australia. Major Austen thinks it would be much wiser for you to retain your species under the name of *S. fuscicauda* Böttcher."

A very valuable paper on Oriental sarcophagids by Ronald Senior-White has recently appeared (see Records Indian Mus., Vol. 26, pp. 193-283, with 12 pls., May, 1924). Mr. White considers *S. fuscicauda* as a typical Malayan species. Yet his numerous data would make it appear that it is characteristically

Indian. From my collection in the Orient and Australia, I had come to this conclusion. That it is essentially a subtropical species, I do not think there is any doubt. I found it along the whole coast of Queensland, extending in diminishing numbers as far south as Brisbane. I got none at Sydney, though I did considerable collecting there. In the Orient, too, I found that it did not extend its range far northward. In the southern half



of Japan and in China, as far north as the Yangtze River, it is by far the most abundant sarcophagid around the habitations of man. It there breeds commonly in the open tanks of human excrement. Under these conditions its maggots have acquired a habit of living in the semiliquid fertilizer. It is interesting to recall that I bred it here in 1916 under very similar conditions in liquid hen-manure.

This fly is undoubtedly an important agent in the dissemination of disease, especially those troubles that are carried in human excrement. When I was making extensive collections of the Diptera that frequented the shops where foods were exposed for sale in Yokohama, I got approximately 20 per cent belong-

ing to this species. Hence, in the adult stage, coming straight from the vilest of breeding places they contaminate candies, fruits, etc., which are commonly eaten without cooking. Children being fond of such foods are especially affected.

It is very evident that this species makes good use of the common carriers of commerce. Mr. Bryan has made an outline map to include all the records which I have been able to collect on its distribution. It will be noted that India, or southern Asia, may well be considered as the home of this species, and that in extending its range it has followed the natural routes of shipping. Inland, too, all the known locations even far removed from the coasts, lie along railways, etc. From these data the best possible guess is that these flies came to us on ships from Yokohama.

Notes on Chrysomyia Megacephala (Fabr.) (Diptera).

BY J. F. ILLINGWORTH.

(Presented at the meeting of April 2, 1925.)

As our investigations of the South Pacific Fauna progress, we find this subtropical fly more and more widely distributed. This is a marked illustration of a pest that gets about by shipping. I wish to record three new outposts.

Swezey and Wilder captured this fly at Leone, Tutuila, Samoa, September 7, 1923. Mr. Bryan, also, later found this species rather abundant on that island.

Again, during his work in the Fiji group, Mr. Bryan found these flies swarming around the odoriferous bags of dried coconut. His specimens are marked Wakaya, Fiji, November 17, 1924. Evidently the arrival of this species in Fiji is very recent. I collected there rather extensively during June, July, and August, 1913, without finding it; yet I did considerable collecting under the same sort of conditions. I took many other sorts of flies swarming over the stale, dried coconut meat.

Doctor Matsumura, Professor of Entomology in the Imperial University at Sapporo, Japan, recently gave me a male specimen of *C. megacephala* that he took with many others in the Bonin Islands. This specimen is labeled Ogasawara, August 20, 1905; determined as *Lucilia dux* Esch. As is now well known, this is a synonym of *C. megacephala.*

During my return from the Orient at the end of September, 1924, I was interested to observe how these flies take advantage of free transportation from one country to another. During sunny, warm days I found them flying about on the top deck, hovering in the vicinity of the ventilation shaft from the kitchen. Here the air was filled with the odors from the preparation of foods. During inclement weather I saw them roosting down inside on the walls of the shaft. Undoubtedly they went down into the kitchen, from time to time, to take a free lunch on the foods exposed there on the tables.

Distressing Itch from a Moth, Euproctis Flava Bremer, in the Orient.

BY J. F. ILLINGWORTH.

(Presented at the meeting of February 5, 1925)

My first experience with this moth was a rather serious one. It was during my stay at Yokohama in July, 1923. While collecting insects that flew to my lamp on the veranda, I saw a fine yellow moth circle about. In order to secure it, I had to grab it in my hand, before I could get it into the cyanide bottle. Going to bed shortly afterward, I put in a miserable night. In the morning I found that I was broken out with a rash. This was distributed in three centers: on the back of my neck; on my back, just above the hips; and on the inside of my right forearm.

My natural conclusion was that something had been biting me in the bed, yet a thorough search disclosed nothing there. Later in the day I spoke of the matter to Dr. S. Kuwana, chief of the Imperial Plant Quarantine Service. He at once told me of an outbreak of a moth which was putting whole villages out of commission. From an examination of his specimens, I at once recognized my trouble. Undoubtedly while undressing, just after I had caught the pernicious moth, I had rubbed myself, distributing the poisonous hairs to the affected areas of my skin. The itching continued for days, and it was several weeks before it entirely disappeared.

I experienced a similar outbreak of these moths in central China, at Chinkiang, near the end of August, 1924. They flew abundantly to lights and crawled into every conceivable hiding place—into bed nets, behind clothing hanging in closets, and even into one's shoes. In this way their vicious hairs became rubbed off, and wherever they came in contact with the tender parts of the skin, set up violent irritation. The native people suffered tremendously from them at that time, since none of their houses are screened. Where the moths got among their bedclothing, whole families were laid up, and worse, the virulence of the scattered hairs continued for weeks, even after all the moths had

disappeared. Every person that slept in the bed became affected. It was found that the only way to get rid of this source of infection was to thoroughly wash everything—a difficult matter with heavy padded comforters, etc., so commnnly used over there.

Briefly reviewing the literature, mostly Japanese, some of which I had translated for me, I found that this moth was a well-recognized pest among the common people of the countryside. In this connection Mills [6] says:

"Reports of injuries by the malignant influence of flying insects are quite common in the Orient. In Korea a wide variety of skin lesions and ulcerative processes are popularly ascribed to insects whose exact nature no one seems to be able to describe. Sharp bodies from the wings rather than stings or bites are usually alleged to be the cause."

As to the source of the stinging hairs there appears to be a considerable difference of opinion among the Japanese writers; also in regard as to whether the injury is a mechanical or a chemical irritation.

Mayekawa,[5] who did careful investigation on these moths from various parts of Japan, found that the body is covered with both scales and hairs. He says that mixed in with the regular scales, though the number is comparatively small, are very minute needle-like hairs. These have the tip divided into three, and the lower end near the axis sharply pointed. Their general structure is practically identical with those found on the caterpillars. Since the female covers the egg cluster with hairs from her body, the tiny poisonous hairs were commonly found in such situations. This author concludes that the irritation is mainly due to the mechanical action of the barbed hairs.

On the other hand, that the action is chemical is maintained by Sato and Koike,[7] who believe it to be an acid, since alkalies partly, but not completely neutralize it. Furthermore, Mills [6] states that the possibility of the presence of a toxin in the fresh hairs is suggested by:

a. Constitutional symptoms in the more severe cases.

b. Marked decrease in irritating properties in hairs after prolonged desiccation.

c. Presence of a patent canal throughout the length of the hairs.

d. Demonstration of dried material within the canals, which was not affected by solvents used.

Though the moth is undoubtedly the main distributor of the poisonous hairs, there is still some question as to whether they are produced by the moth or derived from the shed skin of the caterpillar in the cocoon. Gilmer [1] in his recent most comprehensive paper dealing with the poison apparatus of lepidopterous caterpillars has demonstrated that the poison is the product of a special gland cell. The gland is invariably unicellular no matter what the type of the penetrating organ. Speaking of the moths, however, he says: "In no case have poisonous properties been definitely identified as being inherent in the adult form. A number of species, all belonging to the genus *Euproctis* Hubner, or its near allies, have had the adult reported as urticating . . . ; in the case of *E. chrysorrhea* the urtication is due to larval hairs spun into the cocoon, and removed therefrom by the anal tuft of the adult as it emerges through the cocoon walls. All evidence points to a like origin in other reported cases, since the hairs have the morphological characteristics of the larval hairs in every case."

AN ANNOTATED LIST OF THE PAPERS CONSULTED.

1. Gilmer, Paul M.: A comparative study of the poison apparatus of certain lepidopterous larvae. Ann. Ent. Soc. America, Vol. 18, No. 2, pp. 203-39, 21 figs., June, 1925.

2. Hashimoto, T., and Hagiwara, H.: The poisonous moth, *Euproctis flava* Bremer, and the dermatitis caused by it. Japan. Zeitschr. Dermat. and Urol., Vol. 22, No. 6, pp. 475-91, Tokyo, June, 1922. [Japanese text.] Abstract, Review of Applied Entomology, Ser. B., Vol. 11, p. 4. Records serious epidemics of acute dermatitis caused by the hairs of this moth.

3. Ito, T., and Matsusaki, H.: Ueber eine art von Dermatitis durch nachtschmetterling. Journ. Dermat. and Urol., Vol. 17, No. 4, pp. 60-61, April, 1917. [Japanese text.] Abstract in China Medical Journal, Vol. 31, No. 6, p. 521, November, 1917. This is apparently the first record in Oriental literature of dermatitis caused by the hairs of a moth. Yet, as Mills has pointed out in the above extract, there is a popular belief that many skin troubles thus originate.

4. Koike, S.: The caterpillar (probably *Euproctis flava* Bremer) caus-

ing urticarial dermatitis in Kwan San. Gunidan Zasshi (Journ. Military Surgeons, Japan), No. 76, April 30, 1918, pp. 206-10, 1 pl. Abstract in China Medical Journal, Shanghai, XXXV, No. 2, pp. 177-8, March, 1921; also, Review of Applied Entomology, Ser. B., Vol. 9, p. 118. Records outbreak among Japanese troops on maneuvers. [Japanese text.]

5. Mayekawa, S.: On "Dokuga" or *Euproctis flava* Bremer. Insect World, Vol. 20, No. 228, August, 1916. From a study of the variations of this widely spread moth the author concludes that *Euproctis (Aroa) subflava* Bremer, and *E. (Artoxa) intensa* Butler are synonyms of the above species. This paper gives a comprehensive survey of the pest, historical data, life history, character of injury, treatment, and control. [Japanese text.]

6. Mills, Ralph G.: Observations on a series of cases of dermatitis caused by a Liparid moth (*Euproctis flava* Bremer). China Medical Journal, Vol. 38, No. 5, pp. 351-71, May, 1923. Abstract in Review of Applied Entomology, Ser. B., Vol. 11, p. 151. This paper deals with the medical viewpoint. It gives a historical review and full bibliography. The reviewer uses the name *Nygmia (Euproctis) flava* F.

7. Sato, K., and Koike, S.: Dermatitis caused by the moth *Euproctis flava*. Journ. Dermat. and Urol., Vol. 17, No. 3, p. 59, March, 1918. [Japanese text.] Abstract, China Medical Journal, Vol. 35, No. 1, p. 74, January, 1921. "Poison in needle-shaped hairs, grouped at tip of tail."

8. Tanaka, Kenzo: Notes on life history and biology of *Euproctis flava* Bremer. MS.

Some Observations on the "Silverfish" (Lepisma Saccharina L.) (Thys.).

BY HELENE MORITA,
University of Hawaii.

(Presented by D. L. Crawford at the meeting of May 7, 1925.)

Distribution.

The silverfish occurs commonly in North America, Europe, China, Japan, and the Hawaiian Islands. Like most household insects, it is well-nigh cosmopolitan in its distribution.

Haunts, Habits, Food, and Injury.

The silverfish are found in great numbers in a closet or trunk containing books, magazines, newspapers, or pamphlets which have been left undisturbed for some time. Here they cause much damage by eating the paste and glue from the bindings. They are also found in the wall paper where they feed upon the paste on the back and cause it to loosen. They are found in muslin curtains, linens, starched collars, cuffs, laces and other articles of clothing containing starch, and make holes in them. Silk garments and tapestry have also been damaged, the material in this case being destroyed, apparently not so much for itself as for the stiffening it contained. Silverfish are also not infrequently found around pantries where they infest dry, starchy foods. They have been known, too, to feed upon carpets, furs, leather and the like.

It is found in dark places, always avoiding the light. The rapidity with which it runs and the slipperiness of its body, due to the scales that cover it, make it almost impossible to catch the silverfish without crushing or damaging it.

Response to Light.—Twelve silverfish were put in a box, half of which was covered with glass, and the other with cardboard. It was observed that all of the silverfish almost always kept away from the side through which light could enter. They also ran away rapidly when objects on which they were at work were brought to the light.

Reaction to Sounds.—The silverfish seems indifferent to loud noises. A loud voice, a strong rap upon a board, or the sound of musical instruments is apparently unheard.

Lepisma saccharina is essentially a vegetable feeder, and the substance most in accord with its taste is apparently starch. It also feeds upon animal matter, for in several cases where many were put in one container it was noticed that the dead body of the silverfish, and even the live young ones, were eagerly eaten by their living comrades. In one case, twelve young were eaten by two adults. They also ate the wings of such specimens as they could reach in a rather carelessly preserved collection of butterflies. Through close observation it was seen that *Lepisma saccharina* prefers glazed paper for food to starches made from flour, poi, rice, lily gloss starch, or corn starch. If any one of these starches were left in the container with some glazed paper or label, the insect would feed only on the latter, even so much as to make holes in it. It prefers glazed paper also to ordinary newspaper or writing paper. The glazed paper, in the process of manufacture, passes through a vat of gelatin (glue) in solution before drying follows. This glue used must account for the preference the silverfish gives to this over papers of other make.

Life History.

About sixty adult silverfish were caught and put into glass jars, two in each, for breeding purposes. White glazed paper was put in for food, and these containers were left in the dark. Five weeks later, nine eggs were seen on the paper in one jar. There are usually from seven to twelve eggs. The eggs are colorless, very small and oval in shape. One must look for them very carefully, for they are hardly discernible, being the color of the paper. The eggs hatch after the completion of the embryonic development in about six to ten days later. These young hatch almost wholly like their parents. Each one has six fully developed legs, as when mature, and is similar in form, differing only in the proportions of the parts and in depth of color. It undergoes a series of six to seven molts or changes of the skin before reaching complete development. The periods between the first three molts are shorter than the later ones. The instars or periods between molts cover, in the beginning, three to four

weeks. In these molts all the external parts are thrown off and renewed, thereby providing for an increase in size. Growth in the silverfish takes place at a considerably low rate of speed. In many cases where the young hatched in November, there was growth to only about three-eighths of an inch by the end of February. The period from the time the eggs are laid to the reaching of maturity covers from seven to nine months. Hence there will be from three to four generations in two years' time. This seems to make the rate of multiplication very low; however, it is not so if one stops to consider that the silverfish lays from nine to twelve eggs, and that over 80 per cent of them live to be adults.

Silverfish and Regeneration.

Regeneration is the reproduction of organs or tissues by the animal to replace loss.

Lepisma saccharina has the power of regenerating its antennae and filaments. It was noticed that in silverfish with filaments already destroyed and in some where I clipped them off, a period of two to four weeks elapsed before they were reproduced to their former length.

Antennae are also regenerated. It takes about two or three weeks for the antennae to grow and assume their former length. In three cases the antennae were cut off at the base, and as early as four days later they had commenced regenerating and were about one-eighth of an inch long.

Descriptions of New Species of the Dipterous Family Ephydridae from Hawaii.

BY E. T. CRESSON, JR.
The Academy of Natural Sciences of Philadelphia.

(Presented by E. H. Bryan, Jr., at the meeting of September 3, 1925.)

Scatella terryi n. sp.

The general brownish olive, opaque color, the dearth of mesonotal setulae, and the absence of the whitish spot in the marginal cell, will separate this species from all others known from Hawaii.

Black with halteres yellow. Opaque, brownish olive-green; notopleura, metanotum and abdomen more grayish; face brown. Frons entirely unicolorous or orbits slightly lighter in color. Wings infuscated, with five whitish spots, none in marginal cell; mesonotal setulae sparse; bristles distinct; dorso-centrals, 1:2; acrostichals, 1:0. Fore femora with few long post-flexor bristles.

Length, 2.5 mm.

Type. Male; Wawamalu Beach near Koko Crater, Oahu, December 12, 1922 (E. H. Bryan, Jr.). [Bishop Museum collection.]

Scatella sexnotata n. sp.

This species is distinguished by its general opaque appearance, the well-developed bristles and setulae, and the infuscated wings having six whitish spots, including one in the marginal cell.

Black; halteres yellow and tarsi brown. Subopaque; mesofrontal shining; ocellar tubercle, frontalia and parafrontal almost opaque, greenish-brown pollinose; face opaque, brownish, ochreous; cheeks and lower occiput more greenish. Mesonotum subopaque, brownish, becoming more greenish anteriorly; pleura opaque brownish-cinereous below and on metanotum; scutellum shining, sparsely brown pollinose. Abdomen subopaque, brownish, with apical half of segments more grayish. Legs sparsely brownish. Wings infuscated with six whitish spots, including one in marginal cell at tip of first vein.

All bristles and setulae strong; mesonotum with dorso-centrals 1:2-3 and acrostichals 1:1 with some setulae posteriorly. Fore femora with a post-flexor series of about eight unusually strong bristles, their length more than twice the diameter of femora.

Length, 3 to 3.5 mm.

Type. Male; Waimanalo, Oahu, July 11, 1907 (F. W. Terry)

[Bishop Museum collection.] Paratypes. Six males, three females with same data. [This species has been referred to as *Scatella hawaiiensis* var. *sexnotata*, a manuscript name given to it by Mr. Terry. The type series is from Terry's original material. The species is widespread throughout the group, especially in the lowlands and lower forest. It occurs on Necker, Nihoa, Laysan, and probably other islands to the northwest of Kauai.—E. H. B., Jr.]

Scatella warreni n. sp.

This species has the general appearance of *S. hawaiiensis* Grimshaw, but averages larger, with the setulae more developed and the wings almost immaculate.

Black with halteres yellow. Mesofrontal and mesonotum more or less shining, sparsely brownish pollinose. The general polliniferous vesture is dark brown except on the pleura which is more olivaceous, becoming more grayish below. Abdomen does not show banding. Wings iridescent, rather elongate, almost clear hyaline, with at most faint indication of the usual whitish spots in the submarginal, first posterior and discal cells; veins not undulating at the spots. Face as in *S. sexnotata*, but more prominent in profile and entirely dark brown pollinose. Bristles as in *S. sexnotata*, but less interspersed with setulae on mesonotum, and the large post-acrostichal pair not distinct. The post-flexor bristles of fore femora are less uniform, but the longest are as in *sexnotata*.

Length, 3-3.5 mm.

Type. Male; Haipuaena, Maui, June 25, 1920 (E. H. Bryan, Jr.). [Bishop Museum collection.] Paratypes. One male, six females with same data. [To this species belong specimens collected October 26, 1913, by Mr. Alfred Warren in Honolulu, and discussed in these proceedings, Vol. III, p. 25, as *Ilythea* sp. Other specimens have been collected from the lowlands of Oahu and Maui.—E. H. B., Jr.]

Scatella bryani n. sp.

In this species we have the general appearance of *S. hawaiiensis*, but with the wings of *S. sexnotata*.

Small (2 mm.), black species with halteres yellow. Upper surface shining, sparsely brown pollinose; pleura faintly grayish. Dorso-centrals 1:2, acrostichals 1:0. Fore femora with a few long post-flexor bristles; wings as in *S. sexnotata*.

Type. Male; Awaawapuhi, Kauai, June 16, 1922 (E. H.

Bryan, Jr.). [Bishop Museum collection.] [Also collected about pools of stagnant rainwater near the Bishop Museum, mouth of Kalihi Valley, Honolulu, February 12, 1923.—E. H. B., Jr.]

Brachydeutera hebes n. sp.

This species has much the appearance of *B. argentata*, but is considerably larger; the head much longer with the mouth broader, very gaping and the anterior margin high, in profile; the proclinate ocellar bristles far in advance of the anterior ocellus, and the antennae more widely separated.

Black; palpi, base of halteres, middle and hind femora, tawny; wings hyaline with black veins. Opaque, with abdomen and legs more or less shining. Upper surfaces head and thorax greenish with brown markings and stripes; face, pleura, and venter of abdomen silvery to bluish.

Large species; head longer than high; proclinate bristles far in advance of anterior ocellus, about midway to anterior frontal margin; antennae separated by more than width of third antennal segment; mouth very large, one-third width of head, in profile with anterior margin above center line of eyes.

Length, 4 mm.

Type. Male; Kalihi, Oahu, February, 1923, at stagnant rainwater (E. H. Bryan, Jr.). [Bishop Museum collection.] Paratypes. Five females with same data. [This species has been known locally as *B. argentata* (Walker). It is well distributed throughout lower elevations on Hawaii, Maui, Molokai, and Oahu.—E. H. B., Jr.]

Procanace nigroviridis n. sp.

The bare, uniformly colored frons, without pre-ocellars, distinct dorsocentrals, and the entirely black color with metallic olive-green upper surfaces, are the distinguishing characteristics of this species. The uniform surface of the frons without marked mesofrontal plate, or setulae except along the extreme orbits, or pre-ocellars, and with well-developed dorsocentrals, indicate its position in *Procanace*, as based on its genotype, *P. grisescens* Handel.

Entirely black, including halteres and legs; wings slightly obscure, immaculate, opaque; frons, mesonotum and scutellum overcast with metallic olive-green pollen; face variable, reflecting blue to green or brown, depending upon the aspect; dorsum of abdomen bluish; pleura brown, becoming more grayish below; legs brownish. Frons bare except orbital bristles and hairs; face slightly more prominent between antennae than in *grisescens;* a fine bristle at lower angle; cheeks one-half diameter of eye, with two bristles; clypeus large, brown; arista bare; a vertical series of setulae on

middle of mesopleura; sixth abdominal segment distinctly longer than fifth; genital segment with long pile interspersed with bristles.

Length, 2.5 mm.

Type. Male; Awaawapuhi, Kauai, June 16, 1922 (E. H. Bryan, Jr.). [Bishop Museum collection.]

Ephydrid Fly New to Hawaii.

BY E. H. BRYAN, JR.

(Presented at the meeting of September 3, 1925.)

Canace nudata Cresson.

Mr. Cresson has identified as belonging to this species specimens collected by me at Koko Head, Oahu, July 23, 1922; Wawamalu Beach, just east of Koko Crater, Oahu, December 17, 1922; and Wake Island, July 30, 1923. To this species also belong three specimens collected by F. W. Terry on the beach near Diamond Head, Oahu, March 26, 1911; and a series from Lisiansky Island, collected by Major C. Grant, May 19, 1923.

Additional Notes on the Insects Occurring on Mauna Kea and Mauna Loa.

BY E. H. BRYAN, JR.

(Presented at the meeting of September 3, 1925.)

The island of Hawaii presents an excellent opportunity to the entomologist to study insect life under extreme conditions. Making his headquarters at Kilauea, he may visit a xerophytic desert in Kau, luxuriant fern thickets in the Fern Forest, rich pockets in the smaller craters, native forests, or the barren lava slopes of upper Mauna Loa, 10,000 to 13,000 feet elevation, almost within a day's tramp.

In 1922 (Proc. Haw. Ent. Soc., V, p. 287) I called attention to several records of insects collected at high elevation on Mauna Loa, and recorded several species collected by W. H. Meinecke on the summit of Mauna Kea, elevation 13,825 feet. This past August I had the privilege of accompanying Mr. Meinecke to the top of Mauna Loa, and spending two days in the crater of Mokuaweoweo, about 13,000 feet elevation. Shortly afterward Mr. Meinecke again ascended Mauna Kea, capturing a number of specimens. Thus a few additional records are added to our knowledge of the insects occurring at these high elevations.

The quantity of insects occurring in such a barren place as Mokuaweoweo Crater was a great surprise. Except for a very few small moss plants tucked away in moist cracks, the crater is entirely bare of vegetation. In fact almost nothing grows above 10,000 feet, and very little above 8000. The last plants we encountered were small scrubby "puakeawe" (*Styphelia Tameiameiae*) near Red Hill. Yet flying about or resting on bare lava boulders were numbers of flies of several species, and even butterflies and micro moths. When the sun shone they were lively, but when it went behind a cloud they became sluggish, for even at noontime in August the air is chilly. They were so lively that without a net I was unable to catch all the different species seen. Pursuit was difficult over the rough lava.

The most abundant fly in the crater was *Limnophora arcuata*

Stein. Curiously enough this fly has only been known in the Islands for three years, having been first captured here in 1922. It is now widely distributed throughout the group. Mr. Swezey informs me that it is also abundant in the interior of Kauai. This small anthomyid hovers in the air, and is readily recognized by the four conspicuous dark spots on the abdomen. All the other flies captured have already been reported, but a specimen of *Agromyza pusilla* Meigen settled on my hand long enough to be recognized, and I also saw a small gnat.

Two butterflies, besides the already reported *Pontia rapae*, were captured or seen: *Vanessa cardui* Linn, and *Lycaena boetica* (Linn.). Both were in the crater, and both lively.

It was a surprise to have a specimen of the common pentatomid, *Oechalia griseus* Burm. settle on us while resting at about 13,200 feet elevation. Mr. Meinecke caught another specimen at Kalaieha, on the south slope of Mauna Kea, at some 6400 feet lower elevation.

On Mauna Kea, Mr. Meinecke caught the usual *Amblyteles koebelei* (Swezey); *Chaetogaedia monticola* (Bigot); *Simosyrphus grandicornis* (Macquart); *Sarcophaga pallinervis* Thomson; *Euxoa austalea* (Meyr.); *Scotorythra rara* (But.); *Scotorythra arurea* (Meyr.), and two other rubbed specimens of moths; and a specimen of *Plagithmysus blackburni* (Sharp) caught on Mamani (*Sophora chysophylla* Seem.); also a specimen of *Agrotiphila microreas* (Meyr.) from Ainahou, 6000 feet.

It is interesting to note that, with a few exceptions, the same species of insects are captured each time from both Mauna Kea and Mauna Loa. These species are undoubtedly blown up by the wind from lower elevations. The following is a list of the species positively recorded from these higher elevations on Hawaii:

Species Found at High Elevations on Hawaii.

Hymenoptera.

Amblyteles koebelei (Swezey), Mauna Loa, Mauna Kea.
Bassus laetatorius (Fabr.), Mauna Loa, Mauna Kea.
Echthromorpha fusco-orbitalis (Cam.), Mauna Kea.
Limnerium blackburni Cam., Mauna Loa, Mauna Kea.
Psammochares luctuosus (Cr.), Mauna Loa.

Coleoptera.

Plagithmysus blackburni (Sharp), Mauna Loa, Mauna Kea (on Mamani).
Scymnus notescens (Blackburn), Mauna Loa.

Diptera.

Simosyrphus (Xanthogramma) grandicornis (Macq.), Mauna Loa, Mauna Kea.
Frontina archippivora Williston, Mauna Loa, Mauna Kea.
Chaetogaedia monticola (Bigot), Mauna Kea.
Sarcophaga pallinervis Thomson, Mauna Loa, Mauna Kea.
Haematobia irritans (Linn.), Mauna Loa.
Limnophora arcuata Stein, Mauna Loa.
Borborus sp., Mauna Loa.
Agromyza pusilla Meigen, Mauna Loa (seen).

Hemiptera.

Oechalia griseus (Burm.), Mauna Loa.
Nysius delectus White, Mauna Loa.
Nysius coenosulus White, Mauna Loa.

Lepidoptera.

Vanessa cardui (Linn.), Mauna Loa.
Pontia rapae (Linn.), Mauna Loa, Mauna Kea.
Lycaena boetica Linn., Mauna Loa.
Euxoa austalea (Meyrick), Mauna Kea.
Scotorythra rara (Butl.), Mauna Loa, Mauna Kea.
Scotorythra aruraea Meyrick, Mauna Kea.
Eccoptocera foetorivorans (Butl.), Mauna Loa.

Odonata.

Anax junius Drury, Mauna Loa.

A New Species of Fruit-Fly Parasite from Formosa (Braconidae).

BY DAVID T. FULLAWAY.

(Presented by H. F. Willard at the meeting of December 3, 1925.)

Biosteres formosanus n. sp.

Length of body 5 mm., smooth and shining, finely clothed with silvery hairs; head and thorax ochraceous, abdomen dark amber; body really closely and finely punctate, more coarsely on the head in front of the antennae, puncturation extremely fine on the abdomen; legs and antennae concolorous, but the former in the hind tibiae and tarsi, and the latter distally from segment 2 fuscous; eyes, tips of the mandibles and sheath of the ovipositor black. Head transverse, nearly twice as wide as long, wide between the eyes, which are convex; ocelli near the middle of the vertex, arranged in an obtuse triangle and with a considerable depression next the outer face of each; distance from ocelli to eye-margin more than four times that between ocelli; antennae considerably longer than the body, fairly close together at the base, further removed from the eye than from each other, the sockets deep, with elevated rim, 55-segmented, the scape and pedicel stout, the flagellum filamentous; face wider than long, convex in the middle, depressed at the sides and receding somewhat below, clypeus distinct, the fossae deep, cheeks fairly wide, mandibles stout, curved and apically toothed. Thorax robust, as wide as the head and deeper than wide, sides of the pronotum deeply sulcate, mesothoracic scutum with deep, foveolate parapsidal furrows converging to a small, longitudinal, median depression situated a little before the posterior margin, transverse prescutellar sulcus with four deep fossae, scutellum triangular, metanotum costate, propodeum convex, declivous behind, irregularly areolate, with a short median carina extending caudad from anterior margin, rather hairy, stigmata small and round, mesopleurae with deep and fossulated sulci. Abdomen ovate, somewhat compressed apically, the sides anteriorly collapsed, first and second tergites longitudinally striate and separated by a deep sulcus, the former also longitudinally bicarinate sublaterally and the sides strongly margined as well, following tergites smooth and shining, with a transverse line of fine silvery hairs close to the posterior border, ovipositor exserted and longer than the abdomen. Legs rather slender, femur fairly stout. Wings hyaline, veins fuscous, radius in anterior wing arising at about the middle of the stigma, which is lanceolate, second abscissa somewhat shorter than the first transverse cubitus.

Male smaller, 4.25 mm. long.

Described from two females and four males (type, allotype, and paratypes) reared in South Formosa from pupae of a species of *Dacus* ? infesting a wild fruit, by S. Issiki, April, 1924. Types in collection of Hawaiian Entomological Society.

Table for Distinguishing the Hawaiian Species of the Genus Dryophthorus of the Curculionidae, Cossoninae (Coleoptera).

BY O. H. SWEZEY.

(Presented at the meeting of June 4, 1925.)

While recently working over and determining the several years' accumulation of material in the Family Curculionidae at the Bishop Museum, the writer found that there was need for a table to more readily separate the seventeen known species of the genus Dryophthorus. Accordingly, the following table was produced, and is herewith presented to go on record for use in future work with the species of this genus:

1. Fourth and sixth interstices of elytra running together apically where they are confluent with the raised apical margin..... 2
   Second interstice most prominently continuous with raised apical margin; second, fourth, and sixth interstices elevated and with erect setae..... 3
   Sixth interstice alone continuous with raised apical margin..... 6

2. Interstices of elytra about equally elevated; size, 3.5-4 mm..*modestus*
   Second and fourth interstices slightly more elevated than the rest; size, 2.5-3.25 mm.....*pusillus*
   Second, fourth, and sixth interstices conspicuously more elevated than the rest; size, 5-5.5 mm.....*declivis*

3. Second, fourth, and sixth interstices feebly elevated, and second and fourth feebly interrupted; size, 3-3.75 mm.....*brevipennis*
   Second, fourth, and sixth interstices conspicuously unevenly raised, or interrupted by lower places; size, 3-4 mm.....*verticalis*
   Second and fourth interstices strongly interrupted..... 4

4. First and third interstices slightly elevated; size, 4.4.75 mm..... ..... *insignoides*
   First and third interstices not elevated..... 5

5. Anterior and posterior portions of second interstice equally raised; size, 3.5-4 mm.....*insignis*
   Second interstice more strongly raised in posterior portion; size, 3.5 mm.....*fuscescens*

6. Small sized, 2.5-3 mm..... 7
   Larger sized, 4-7 mm..... 8

7. Second and fourth interstices slightly elevated; size, 2.5-2.7 mm. ..... *oahuensis*
   Second and fourth interstices sharply carinate; size, 3 mm. *kauaiensis*

8. Interstices with cinereous or ashy bloom 9
   Interstices without cinereous or ashy bloom 11

9. Second and fourth interstices elevated more than others; size, 6-6.5 mm ..... *crassus*
   Interstices about evenly elevated 10

10. Interstices bearing distinct minute asperities; size, 6-7.75 mm. *nesiotes*
    Interstices without above asperities; size, 4-6 mm ..... *squalidus*

11. Second interstice more elevated than others; size, 5-7 mm .... *gravidus*
    Second and fourth interstices more elevated than others; size, 4.5-6 mm ..... *homoeorhynchus*
    Interstices equally elevated 12

12. Interstitial punctures larger than in most species and closely set, giving interstices a knobbed (?) appearance; size, 6-6.5 mm. .... *peles*
    Interstitial punctures moderate in size (not unusual); size, 4-5.5 mm. ..... *distinguendus*

TABLE OF ISLAND DISTRIBUTION OF THE SPECIES OF DRYOPHTHORUS IN HAWAII.

Dryophthorus	Kauai	Oahu	Molokai	Lanai	Maui	Hawaii	Host trees so far as known
squalidus Shp.		Tantalus Palolo [1]	(Common throughout Islands) Kamiloloa		Olinda [1]	Kaumana [1] Kilauea	Pipturus Koa Hau
distinguendus Perk. ..		Tantalus Niu [1] Palolo [1] Opaeula [1] Makaha [1] Manoa [1 5] Makaleha [1]	(Common throughout Islands)			Kilauea Hakalau [1] Kaumana [1] Olaa [1]	Koa Bamboo Kukui
pelex Perk.						Kilauea	
nesiotes Perk.	Mts., 4000 ft. Kokee [1]						Koa Tetraplasandra
gravidus Shp.	Milolii [1]	Tantalus	X	X	X	X	Lobelia
crassus Shp.		Tantalus Niu [1]			X Waikamoi [1]		Koa
homoeorhynchus Perk.	Mts., 2000-4000 ft. Kokee [1]	Lanihuli [2] Pupukea [1]			Iao Valley [1]		Dracaena
declivis Shp.		Tantalus Olympus [1] Palolo [1] Niu [1] Pacific Hts.[1]	X			X	Koa Pipturus Labordea Cibotium
modestus Shp.	Kokee [1] Nualolo [1] Milolii [1]	Tantalus Konahuanui [1] Olympus [1] Palolo [1]			X	X Waimea [1]	Koa Cibotium

	Kauai	Oahu	Molokai	Lanai	Maui	Hawaii	Host trees so far as known
pusillus Shp.		Tantalus Konahuanui [1] Palolo [1]				Kohala [3]	Cibotium
oahuensis Perk.		Tantalus Waianae Mts.					Pipturus
kauaiensis Perk.	Mts., 4000 ft.						
insignis Shp.	Kealia [4]	Tantalus Konahuanui [1] Olympus [1] Palolo [1] Niu [1] Waiawa [1] Waiahole [1] Kaala [1] Pacific Hts.[1]	(Mountains of All Islands)				Cibotium Labordea
insignoides Perk.	X	Tantalus	?	?			
brevipennis Perk.	Mts., 4000 ft.						
fuscescens Perk.	Mts., 4000 ft.						
verticalis Perk.	Mts., 4000 ft.						

Most of the records are from the Fauna Hawaiiensis.

[1] Collected by O. H. Swezey.
[2] Collected by J. C. Bridwell.
[3] Collected by F. X. Williams.
[4] Collected by L. D. Larsen.
[5] Collected by E. M. Ehrhorn.

Butterflies of Banff, Canada, and Vicinity, Collected in July and August, 1922.

BY O. H. SWEZEY.

(Presented at the meeting of October 1, 1925.)

The collection of butterflies exhibited at this time were taken during a vacation trip to the Rocky Mountain Park in the Canadian Rockies. About four weeks were spent at Banff and vicinity during the latter half of July and the first part of August, 1922. For most of the time, headquarters was at Mr. Wheeler's camp on the lower slope of Sulphur Mountain, about half a mile from the clubhouse of the Canadian Alpine Club. One week was spent on a hiking trip following trails connecting a series of camps maintained by Mr. A. O. Wheeler on what was called the Walking Tour to Mount Assiniboine. On this tour two trips were conducted weekly during the summer, going up the Spray River Valley to the Assiniboine camp near Mount Assiniboine, then following the Continental Divide some distance, returning via Golden Valley and Healy Creek, about seventy-five miles for the circuit. There were nine in the party that we went with, some riding ponies if they cared to; but, in walking, I had time to make the camps at the times scheduled and opportunities to collect butterflies and other insects along the way. One whole day was spent at the Assiniboine camp at an elevation of about 8000 feet.

The nomenclature used in this list is that of the Check-List of the *Lepidoptera* of Boreal America by Barnes and McDunnough, 1917.

Pieridae.

Eurymus meadi elis Stkr., 1 specimen, Assiniboine.

Eurymus eurytheme Bdv., 10 specimens, Banff; 2 Sundance Canyon.

Eurymus nastes Bdv., 1 specimen, Assiniboine.

Satyridae.

Cercyonis oetus charon Edw., 7 Specimens, Banff.

Oeneis chryxus ivallda Mead., 1 specimen, Banff; 2 Spray River; 1 Healy Creek.

Erebia epipsodea Butl., 6 specimens, Spray River.

Nymphalidae.

Argynnis coronis Behr., 2 specimens, Banff.

Argynnis eurynome Edw., 3 specimens, Stony Squaw Mountain; 3 Healy Creek.

Brenthis chariclea Schneid., 1 specimen, Banff; 3 Assiniboine; 2 Golden Valley; 3 Spray River.

Brenthis bellona Fabr., 1 specimen, Spray River; 1 Healy Creek.

Euphydryas nubigena beani (Skin.), 2 specimens, Spray River; 2 Assiniboine.

Euphydryas anicia (Dbldy. and Hew.), 1 specimen, Sulphur Mountain; 1 Stony Squaw Mountain; 3 Spray River.

Melitaea palla (Bdv.), 1 specimen, Golden Valley.

Phyciodes tharos Dru., 2 specimens, Banff; 1 Spray River; 1 Stony Squaw Mountain; 1 Sundance Canyon.

Phyciodes camillus Edw., 3 specimens, Banff; 1 Spray River; 1 Golden Valley; 3 Healy Creek.

Aglais californica Bdv., 1 specimen, Banff.

Basilarchia lorquini Bdv., 1 specimen, Banff; 1 Lynn Canyon, B. C.; 1 Capilano Canyon, B. C.

Lycaenidae.

Heodes mariposa Reak., 1 specimen, Spray River; 1 Golden Valley; 5 Sundance Canyon; 1 Lake Louise.

Plebius melissa Edw., 3 specimens, Banff; 6 Spray River; 4 Golden Valley; 5 Healy Creek; 14 Sundance Canyon; 1 Lake Louise.

Glaucopsyche xerces antiacis Bdv., 3 specimens, Spray River; 1 Healy Creek.

Hesperiidae.

Thanaos juvenalis Fab. (?), 1 specimen, Healy Creek. (Too much worn for positive determination.)

Pamphila comma manitoba Scud., 1 specimen, Banff; 4 Spray River; 1 Sulphur Mountain.

Kilauea Moths

BY O. H. SWEZEY.

(Presented at the meeting of November 5, 1925.)

The moths of this list were collected in August, 1925, by Mr. W. M. Giffard at lights on the lanai of his bungalow in the forest at Twenty-nine Miles, Kilauea, Hawaii. There are fifty species in the list.

NOCTUIDAE.

1 *Eriopygodes euclidias* (Meyr.).
4 *Cirphis unipuncta* (Haw.).
1 *Cirphis macrosaris* (Meyr.).
3 *Lycophotia margaritosa* (Haw.).
1 *Agrotis ypsilon* Rott.
1 *Agrotis crinigera* (Butl.).
1 *Agrotis selenias* Meyr.
4 *Hypenodes epichalca* Meyr.
1 *Hypenodes altivolans* (Butl.)
2 *Nesamiptis obsoleta* (Butl.)
3 *Plusia biloba* Steph.
10 *Plusia chalcites* Esp.
1 *Plusia pterylota* Meyr.
1 *Plusia giffardi* Sw.

HYDRIOMENIDAE.

22 *Eucymatoge monticolans* (Butl.)
2 *Hydriomena aphoristis* Meyr.
1 *Hydriomena giffardi* Sw.
3 *Hydriomena roseata* Sw.

SELIDOSEMIDAE.

2 *Scotorythra aruraea* Meyr.
3 *Scotorythra rara* (Butl.).
6 *Scotorythra hyparcha* Meyr.

PYRAUSTIDAE.

23 *Omiodes accepta* (Butl.).
2 *Omiodes scotaea* (Hamp.).
5 *Phlyctaenia synastra* Meyr.
1 *Phlyctaenia eucrena* (Meyr.).
4 *Phlyctaenia metasema* Meyr.
1 *Phylctaenia stellata* (Butl.).
1 *Phlyctaenia endopyra* Meyr.
2 *Phlyctaenia pyranthes* Meyr.
1 *Pyrausta chloropis* Meyr.
6 *Mestolobes amethystias* Meyr.
3 *Mestolobes xanthoscia* Meyr.
2 *Mestolobes minuscula* (Butl.).
7 *Mestolobes ochrias* Meyr.
62 *Orthomecyna metalycia* Meyr.
2 *Scoparia balinopis* Meyr.
3 *Scoparia crataea* Meyr.
2 *Scoparia ianthes* Meyr.
5 *Scoparia marmarias* Meyr.
3 *Scoparia pyrseutis* Meyr.
2 *Scoparia thyellopis* Meyr.
7 *Scoparia melichlora* Meyr.
10 *Scoparia meristis* Meyr.

PTEROPHORIDAE.

10 *Platyptilia fuscicornis* Z.

HYPONOMEUTIDAE.

4 *Hyperdasys cryptogamiellus* Walsm.

CARPOSINIDAE.

1 *Heterocrossa gemmata* Walsm.
1 *Heterocrossa* sp.

TORTRICIDAE.

1 *Archips subsenescens* Walsm.
5 *Amorbia emigratella* Busck.

TINEIDAE.

10 *Heiroxestis omoscopa* Meyr.

Mango Weevil—Correction of Name (Col.).

BY O. H. SWEZEY.

(Presented at the meeting of November 5, 1925.)

In a list of common names of insects in the June, 1925, issue of the "Journal of Economic Entomology," the name used for the mango seed weevil is *Sternochestus mangifera* Fab. I noted that this generic name was spelled differently than what we had been using in the "Proceedings of the Hawaiian Entomological Society" of late years. We were using *Sternochaetus*. I wondered which was the correct spelling, so looked it up in generic lists, or at least tried to. I failed utterly in finding either of these names in any of the published lists of genera, or in recent volumes of the Zoological Record. Being at a loss as to how to account for having used *Sternochaetus* instead of *Cryptorrhynchus* in the "Proceedings" since 1920, not remembering where we had found the name *Sternochaetus,* I wrote to Dr. Guy A. K. Marshall in regard to this name.

In Doctor Marshall's reply, recently received, he said that *Sternochaetus* had been used for a short time in "The Review of Applied Entomology," on the strength of information from Dwight Pierce in a letter, who had used it and considered it a good name of Kolbe's. Doctor Marshall further says: "Having occasion to describe a *Cryptorrhynchus* I looked into the matter, and I have entirely failed to find any publication of this name. Moreover, I cannot find any grounds as yet for Pierce's view that *mangiferae* F. is generically separable from the genotype of *Cryptorrhynchus,* namely, *C. lapathi* L. I should, therefore, recommend you to use the name *Cryptorrhynchus mangiferae* for your insect."

So, I consider the matter settled, and we will drop *Sternochaetus,* and go back to *Cryptorrhynchus* which we had been using up to 1920.

Arrenophagus Albipes Girault in Hawaii (Hym.).

BY O. H. SWEZEY.

(Presented at the meeting of December 3, 1925.)

This little scale parasite of the family Encyrtidae was probably one of the early ones introduced by Koebele at the time when for many of his introductions complete records were not made. It was described by Girault * from slide mounts in the United States National Museum, labeled as follows: "1389. *Chionaspis eugeniae* Mask. On female scales. Hong Kong, China, Koebele." "Parasite of orange scurvy scale from Kiomachi, Gifu, Japan (Nawa), January 30, 1899." "1407. *Diaspis brasiliensis*. On fern, Jamsui. A. Koebele."

The first record of its occurrence in Hawaii is a note by Timberlake in Proc. Haw. Ent. Soc., V, p. 33, 1922. Here it is recorded under the name *Arrenophagus chionaspidis* Aurivillius, from specimens reared by Ehrhorn from male scales of *Phenacaspis eugeniae*, collected at Kahala (by oversight spelled Kohala in the note), Oahu, October 23, 1921. The note intimates that, although it had not been previously collected, it had probably been present for many years, as Ehrhorn had observed exit holes of a parasite in the male scales of *Phenacaspis* at various times since his arrival in Honolulu in 1909.

In Proc. Haw. Ent. Soc., V, p. 433, 1924, Timberlake corrects the name given in the previous note, using *albipes* instead of *chionaspidis*, and remarking that it has since been found commonly in Honolulu, and was taken at Kahuku, Oahu, November 8, 1923, by Pemberton.

In pruning oleander on November 11, I found an infestation of *Phenacaspis eugeniae*, and on examining closely a few infested leaves, I noticed several tiny parasites moving about among the scales. On mounting some of them, they prove to be the species under discussion. They were very abundant on the few leaves examined, half a dozen or more per leaf. When the scales were examined closely a large proportion of them were found to be

Proc. Haw. Ent. Soc., VI, No. 2, July, 1926.

* Journal N. Y. Ent. Soc., XIII, p. 242, 1915.

parasitized. These parasitized scales were chiefly young female scales, only about half-grown or less. Some male scales were also parasitized, as has been previously reported. Three hundred and nine parasitized scales were counted on one leaf. On a later examination of the oleander tree, fifty-three of the parasites were counted on one leaf. All of which goes to show how abundant this parasite is at the present time. I have examined oleanders since in various parts of the city, and always the parasite was found on any infestation of the *Phenacaspis*. The same condition was found on a number of kukui trees also, which is another favorite host of this scale.

Casinaria Infesta (Cress.) in Hawaii (Hym.).

BY O. H. SWEZEY.

(Presented at the meeting of December 3, 1925.)

This ophionid parasite was first noticed in the Hawaiian Islands in February, 1921, when it was noted abundantly among weeds at Kaimuki, Oahu. It had probably bred on larvae of *Hymenia recurvalis* Fab., for this moth was very abundant there at the time. In August of the same year it was found in the forests of the Kokee region on Kauai. March 22, 1924, a specimen was collected among weeds along a plantation trail at Hana, Maui.*

Specimens were determined by Mr. R. A. Cushman of the United States Bureau of Entomology. The species was described from Texas, and is known to occur from Florida to Maryland and west to Kansas. It is not known how it has reached Hawaii, but probably as a natural immigrant. At least we do not know of any attempt to introduce it here. The host of this parasite in Hawaii has so far always been some species of leaf-roller caterpillar. I have reared it from caterpillars of the following species collected from their respective food-plants, dates and localities being given:

Phlyctaenia argoscelis (Meyr.), on *Rumex,* Kokee, Kauai, August 18, 1921.

Phlyctaenia ommatias Meyr., on *Dubautia,* Alakai Swamp, Kauai, August 22, 1921.

Omiodes monogona Meyr., on *Erythrina,* Palmer's Crater, Oahu, February 5, 1922.

Phlyctaenia stellata (Butl.), on *Pipturus,* Tantalus, Oahu, January 10, 1923.

Hymenia recurvalis Fab., on *Amaranth,* Kaimuki, Oahu, April 11 and 24, 1923.

Omiodes asaphombra Meyr., on *Joinvillea,* Hanamaulu, Kauai, May 13, 1923.

Proc. Haw. Ent. Soc., VI, No. 2, July, 1926.

* More recently a specimen was captured in Bermuda grass near the Haleakala ranch office at Makawao, Maui, March 4, 1926.—Editor.

Pyrausta dryadopa Meyr., on *Scaevola,* Lanipo, Oahu, June 11, 1924.

Phlyctaenia platyleuca Meyr., on *Touchardia,* Kaala, Oahu, March 1, 1925.

Phlyctaenia iocrossa Meyr., on *Cyrtandra,* Puu Kaua, Waianae Mountains, Oahu, March 21, 1926.

The host caterpillar finishes its growth before being killed by the parasite larva inside of it, and makes its cocoon for pupation (usually merely spun-together leaves serving the purpose of cocoon), then the parasite larva soon finishes its growth by consuming all of the inner parts of the caterpillar, finally breaking through the skin and making its own brown cocoon within the cocoon of its host. Issuance of the adult parasite takes place in about a week or ten days.

With the exception of *Hymenia recurvalis* above mentioned, all these host caterpillars are rather scarce. A related leaf-roller (*Omiodes blackburni*) is a bad pest on coconut leaves. It would be a good thing if *Casinaria* would take to this leaf-roller, but I have not yet reared it from this species.

Records of Hawaiian Dermaptera and Orthoptera of the Family Gryllidae.

BY MORGAN HEBARD
Philadelphia, Pa.

(Presented by E. H. Bryan, Jr., at the meeting of December 3, 1925.)

Material, secured subsequent to our studies in Hawaiian Dermaptera and Orthoptera, has recently been received from the Bernice Pauahi Bishop Museum. One species previously unknown from the Islands is represented, as well as several of the scarcer forms, in the series of 114 specimens here recorded.

DERMAPTERA.

LABIDURIDAE.

PSALINAE.

Anisolabis eteronoma (Borelli).

Waiohinu, Kau, Hawaii, VIII, 4, 1923 (W. H. Meinecke), 1 ♂, 2 ♀. Honaunau, Hawaii, VI, 22, 1922 (J. F. Illingworth), 1 ♂.

Anisolabis perkinsi Burr.

Kauai, 2000 to 4000 feet, III, 1919 (J. A. Kusche), 1 ♂, 3 ♀, 2 juv. ♀. Olokele Canyon, Kauai, II, 1919 (J. A. Kusche), 1 ♀. Kaholuamano, Kauai, IV, 1920 (J. A. Kusche), 1 ♂.

Euborellia annulipes (Lucas).

Kilauea, Hawaii, VIII, 22 (B. Clarke), 1 ♀. Hawi, Hawaii, VI, 22, 1922 (M. C. Neal; near shore), 1 ♂. Hilo, Hawaii, VI, 22, 1922 (J. F. Illingworth), 1 juv. ♀. Moanalua, Oahu, IV, 9, 1922 (E. H. Bryan, Jr.), 2 ♀. Honolulu, Oahu, IX, 1923, 1 juv. Waianae Mountains, Oahu (J. F. Illingworth), 3 ♀. Mount Tantalus, Oahu, IX, 7, 1923 (S. C. Ball), 1 ♀. Nuuanu, Oahu, VIII, 27 and IX, 15, 1922 (S. Bickerton), 1 ♂, 1 ♀. Waialae Beach, Oahu, X, 16, 1922 (J. F. Illingworth), 1 ♀. Kalihi, Oahu,

VIII, 18, 1923 (O. E. Cheatam), 1 ♀. Wawamalu Beach, near Koko Crater, Oahu, XII, 17, 1922 (E. H. Bryan, Jr.), 1 ♂, 2 ♀. Koko Head, Oahu, XII, 10, 1922 (J. F. Illingworth), 3 ♂, 2 ♀. Kailua, Maui, VI, 19, 1920 (E. H. Bryan, Jr.), 1 ♀. Keanae, Maui, VII, 4, 1920 (E. H. Bryan, Jr.), 2 ♀. Kokee, Kauai, I, 1919 (J. A. Kusche), 2 ♀. Kauai, 2000 to 4000 feet, II and III, 1919 (J. A. Kusche), 2 ♂, 3 ♀, 1 juv. ♀.

LABIIDAE.

LABIINAE.

Sphingolabis hawaiiensis (Bormans).

Hilo, Hawaii, VI, 22, 1922 (J. F. Illingworth), 2 ♂, 1 ♀. Moanalua, Oahu, IV, 9, 1922 (O. H. Swezey), 2 ♂. Waialae Iki, Oahu, III, 21, 1920 (E. H. Bryan, Jr.), 1 ♀. Honolulu, Oahu (J. F. Illingworth), 1 ♀. Honopu, Kauai, VI, 20, 1922 (E. H. Bryan, Jr.; from a dead goat), 1 ♂, 1 ♀.

Labia pilicornis (Motschulsky).

Kealakekua, Hawaii, VIII, 12, 1919 (O. H. Swezey), 1 ♀.

Labia dubronyi Hebard.

Kuliouou, Oahu, XII, 22, 1918 (O. H. Swezey), 1 ♀. Palolo, Oahu, II, 26, 1922 (O. H. Swezey; from rotten *Charpentiera*), 1 ♀. Makaleha, north slopes Mount Kaala, Oahu, I, 8, 1922 (O. H. Swezey), 1 ♂. Kaumuahona, Oahu, XI, 17, 1918 (O. H. Swezey), 3 ♀. Olokele Canyon, Kauai, II, 1919 (J. A. Kusche), 1 ♂. Halehaku, Maui, VI, 16, 1920 (E. H. Bryan, Jr.), 1 ♂.

CHELISOCHIDAE.

CHELISOCHINAE.

Chelisoches morio (Fabricius).

Honolulu, Oahu, VI, 1919 (J. F. G. Stokes), 1 ♂, 1 ♀. Kalihi Pali, Oahu, IX, 18, 1921 (E. H. Bryan, Jr.), 1 juv. Sacred Falls, Oahu, I, 22, 1922 (E. H. Bryan, Jr.), 1 ♂. Moanalua, Oahu, X, 21, 1922 (E. H. Bryan, Jr.), 1 ♀, 3 juv.

ORTHOPTERA.

GRYLLIDAE.

TRIGONIDIINAE.

Paratrigonidium gracile Perkins.

South Kona, Hawaii, VIII, 8, 1919 (O. H. Swezey), 1 ♂, 1 ♀.

Paratrigonidium varians Perkins.

South Kona, Hawaii, VIII, 8, 1919 (O. H. Swezey), 1 ♀. Makaleha, north slopes Mount Kaala, Oahu, I, 8, 1922 (O. H. Swezey), 1 ♀. Mount Olympus, Oahu (O. H. Swezey), 1 ♂, 2 ♀. Kaumuahona, Oahu, XI, 23, 1919 (O. H. Swezey), 2 ♀. Halehaku, Maui, VI, 16 and 24, 1920 (E. H. Bryan, Jr.), 1 ♂, 1 ♀. Wailuanui, Maui, VII, 2, 1920 (E. H. Bryan, Jr.), 1 ♀.

Paratrigonidium saltator Perkins.

Lanihuli, Oahu, V, 25, 1918 and XI, 24, 1919 (O. H. Swezey), 1 ♂, 1 ♀. Waialae Iki, Oahu, III, 21, 1920 (O. H. Swezey), 1 ♀.

Paratrigonidium pacificum (Scudder).

South Kona, Hawaii, VIII, 8, 1919 (O. H. Swezey), 3 ♀. Judd Trail, Hawaii, VIII, 14, 1919 (O. H. Swezey), 1 ♀. Mount Kaala, western side, Oahu, VI, 1, 1918 (O. H. Swezey), 1 ♂. Iao Valley, Maui, VIII, 8, 1918 (O. H. Swezey), 2 ♀.

ENEOPTERINAE.

Prognathogryllus robustus Perkins.

Kaholuamano, Kauai, IV, 1920 (J. A. Kusche), 2 ♂.

Prognathogryllus alatus Brunner.

Kuliouou, Oahu, XII, 22, 1918 (O. H. Swezey), 1 juv. ♂, 1 juv. ♀.

Prognathogryllus oahuensis Perkins.

Lanihuli, Oahu, XI, 24, 1918 (O. H. Swezey), 1 ♀. Kailua, Maui, VI, 18, 1920 (E. H. Bryan, Jr.; from dead twig of Coprosma), 1 ♂.

We are satisfied that of the four species described by Perkins [1] but two are valid. Examination of the types is, however, necessary to determine whether the synonyms are referable to *alatus* or to the insect we have recognized as *oahuensis*.[2]

Mount Kaala, Oahu, II, 18, 1923 (O. H. Swezey; on *Gunnera*), 2 ♂. Mount Konahuanui, Oahu, II, 23, 1919 (O. H. Swezey), 1 ♂. Kaholuamano, Kauai, IV, 1920 (J. A. Kusche), 1 ♀. Kaiwiki, Hawaii, IX, 12, 1918 (O. H. Swezey), 2 ♂, 1 ♀.

Leptogryllus nigrolineatus Perkins.

Waialae Iki, Oahu, XII, 17, 1922 (W. H. Meinecke), 1 ♀. Kaumuahona, Oahu, XI, 17, 1918 (O. H. Swezey), 1 ♀. Manoa Valley, Oahu, X, 15, 1919 (E. H. Bryan, Jr.), 2 ♀.

The eleven specimens of *Leptogryllus* here recorded further strengthen our belief that only a few variable species can be recognized, rather than many forms, as Perkins supposed.

MYRMECOPHILINAE.

Myrmecophila americana Saussure.

1877. *Myrmecophilus americanus* Saussure, Mel. Orth., Fasc. V, p. 461. [♀, Colombia.]

Honolulu, Oahu, Bishop Museum Building, I, 17, 1924 (O. H. Swezey and E. H. Bryan, Jr.), 1 ♂, 3 ♀. The ant host of this series is *Prenolepis longicornis* Latr.

This minute dark species, with a broad whitish transverse bar on the mesonotum, was originally described from Colombia. Later it has been reported from Pará, Brazil, and from Bombay, Khandala and Wallon, India.[3] The Asiatic series were described as *M. prenolepidis* by Wasmann, a name which has been synony-

[1] Fauna Hawaiiensis, II, p. 25 (1899).

[2] Occasional Papers, B. P. Bishop Museum, VII, p. 368 (1922).

[3] Schimmer, Zeitschr. für Wissensch. Zool., XCIII, p. 427 (1909).

mized by Schimmer. Some of the North African forms of this genus which have been described are extremely close, indicating the possibility of further synonymy.

This is the first Hawaiian record for the present minute but widespread myrmecophilous cricket.

New Species of Hawaiian Chalcid-Flies (Hymenoptera).

BY P. H. TIMBERLAKE.
Citrus Experiment Station, University of California,
Riverside, California.

(Presented by title by O. H. Swezey at the meeting of December 3, 1925.)

The types of the following new species of chalcid-flies will be deposited in the collection of the Hawaiian Entomological Society and paratypes, where available, will be placed in the United States National Museum.

PTEROMALIDAE.

Bruchobius vagabundus n. sp.

This species differs from *B. laticeps* Ashmead and *B. colemani* Crawford by having both mandibles quadridentate, the color of head and thorax of female mainly black, the first funicle joint about as long as pedicel, the stigmal and postmarginal veins equal and about two-thirds as long as the marginal, etc. A comparison with *B. medius* Masi is hardly necessary, as that species was transferred by Masi in 1924 to *Aplastomorpha*.

Female. Head wider than thorax, moderately thick fronto-occipitally, the anterior surface moderately convex; as seen from in front not quite circular, being slightly wider than long and subtruncate at the mouth; as seen from above widest at line touching posterior margin of eyes and with the frons somewhat emarginated by the scrobal impression. Eyes small, oval, not quite twice as long as wide. Malar space about as long as width of eyes. Vertex nearly two-thirds as wide as whole head and slopingly declivous behind ocelli. Ocelli in a very obtuse angle, the posterior pair nearly as far from margin of eyes as their own distance apart. Scrobes in the form of a moderately deep groove reaching nearly to the anterior ocellus. Antennae inserted a short distance above the ocular line, the sockets small, circular and placed only a little more than their own diameter apart. Scape slender, perfectly cylindrical and not quite reaching to anterior ocellus. Pedicel as long as the first funicle joint. First ring joint very short and discoid, the second about twice as long as first, yet wider than long, the third rather large, as long as wide and somewhat more than one-third as long as the following joint. Following joints of flagellum increasing slightly in thickness to apex of first joint of club and from

there rapidly tapering to the acute apex. First funicle joint about twice as long as thick, the following joints gradually shortening, the fifth being about one-fourth longer than wide. First joint of club a little longer than preceding joint and one-fourth longer than the following joint, which is about as long as thick; apical joint of club triangular in outline and about as long as its basal width. Both mandibles quadridentate. Maxillary palpi four-jointed; first joint very slightly longer than third, the second a little longer than first and about one-third longer than wide, the fourth elongate oval and about as long as the second and third combined. Labial palpi rather stout, three-jointed; first and third joints about equal and a little longer than wide, the second very short and transverse.

Thorax robust, about one-fourth longer than wide, strongly depressed above except toward the sides, and the outline of notum as seen from the side nearly straight from pronotum to middle of scutellum and thence gently arcuate to apex of scutellum. Pronotum as wide as mesonotum, arcuate, somewhat broadened toward the sides and with the anterior margin sharp. Scutellum a little broader than long, broadly rounded at apex, depressed on disk toward base but convexly rounded toward sides and apex. Neck of propodeum short. Abdomen broadly ovate, depressed, as long as and a little broader than thorax.

Wings broad, reaching somewhat beyond apex of abdomen; marginal fringe absent; discal setae short, fine, moderately dense, sparser and finer on posterior margin of disk opposite the marginal vein and absent on base of disk to distal end of submarginal vein; costal cell with only a few setae irregularly placed and mostly on apical half. Marginal vein somewhat less than one-half as long as submarginal; stigmal and postmarginal veins equal and about three-fourths as long as marginal; stigmal vein slender at base, subovally capitate at apex and provided with a short spur.

Head and thorax finely and closely puncto-reticulate by means of distinctly raised lines, the head slightly more shiny than thorax. Reticulations finer and rounded on pronotum and mesonotum and producing a rather dull surface; similar on vertex, but gradually becoming much lengthened toward center of occiput, and somewhat coarser and longitudinally lengthened on frons and face. Lines on the face gradually becoming more and more striate and converging toward the mouth, the clypeal region having the reticulations entirely replaced by close, distinct striae. Metanotum polished. Propodeum closely puncto-reticulate much like the mesonotum but a little more shiny. Pleura with the reticulations somewhat coarser than those on notum, mostly not rounded and absent on polished triangular area just below base of hind wings and on narrow dorsal margin of mesopleura as far anteriorly as base of fore wings. Coxae more finely and delicately reticulate than body. Abdomen highly polished.

Pubescence of head and mesonotum fine, short, appressed, rather sparse but quite conspicuous on account of its glistening white color. Pubescence of flagellum and legs very fine and appressed, whitish but not conspicuous.

Sides of propodeum with a small tuft of erect, not very long, whitish hair. Abdomen almost bare.

Head and thorax black, not metallic, except on anterior surface of head, which has a slight dark greenish blue luster; the polished metanotum and abdomen very dark green with a brassy luster. Eyes black, mandibles dark castaneous. Scape and pedicel pale brownish yellow, the flagellum darker brown or more or less infuscated. Legs yellowish brown, the coxae concolorous with body, the apex of tibiae and basal half, more or less, of tarsi pale yellowish white. Tegulae rather dark brown. Wings clear hyaline, the veins yellowish.

Length of body (1.77 to 2.63) 2.37; length of head, 0.704, width of head, 0.860; thickness of head, 0.435; length of antennae (without the very short radicle joint) 1.136; width of mesoscutum, 0.730; length of fore wing, 1.563; width of fore wing, 0.762 mm.

Male. Very similar to the female in many respects. Head, relative to the thorax, a little larger than in female; antennae hardly increasing in thickness toward apex, the apex of club rounded; abdomen much smaller than in female, about one-fourth longer than wide, about two-thirds as long and not as wide as thorax, very strongly depressed and suborbicular, except that it is strongly narrowed toward the short petiole. Sculpture similar to the female, but the reticulation of mesonotum coarser, being no finer than that on frons and not producing a dull surface. Pubescence nearly the same as in the female, but less conspicuous.

Head and thorax dark green with a strong luster on anterior surface of head and on mesonotum. Abdomen testaceous yellow on basal half, bluish black above on following part except apical tergite, which, with the apical half of venter, is greenish. Antennae brownish yellow, the basal half of scape yellowish white, the last three or four joints of flagellum more or less fuscous. Legs brownish yellow, distinctly paler than in the female, but apex of tibiae and base of tarsi yellowish white as in that sex.

Length of body (1.61 to) 1.87; length of head, 0.631; width of head, 0.757; thickness of head, 0.378; length of antenna (without the short radicle joint) 0.977; width of mesoscutum, 0.662; length of fore wing, 1.323; width of fore wing, 0.664 mm.

Described from thirty-eight females and thirteen males (holotype female, allotype and paratypes) reared May 2 to 14, 1923, from a mixed infestation of *Mylabris quadrimaculatus* (Fabricius) and *M. chinensis* (Linnaeus) in pigeon peas, collected by O. H. Swezey in Honolulu; one female (paratype) in laboratory at Honolulu, April 25, 1923, and probably an escape from the above material; one female (paratype) on laboratory window, Honolulu, September 13, 1916 (Timberlake); and one female (paratype) reared from *Mylabris*, Bangalore, India, February, 1921 (Subermanian).

Pachyneuron eros Girault.

Pachyneuron eros Girault, 1917, Descr. Hym. Chalc. vår. cum Observ., 5, Glendale, Md., p. 1.

This species was so briefly described by Girault that a fuller description will not be out of place. It is easily distinguished from other species of *Pachyneuron* by the transverse, smooth and shining propodeum, the smooth petiole of abdomen with a prong on each side about at the middle, and by the tridentate left mandible. There are no true carinae on the propodeum, contrary to Girault's statement, although the outer margin of the foveae simulates the appearance of a carina in certain lights.

Pachyneuron eros has been made the type of the genus *Nepachyneuron* by Girault (l. c., p. 9) on the basis of the tridentate left mandible, but I do not believe this character is valid.

Female. Head rather thin fronto-occipitally, considerably broader than long, widest a little above middle and with the cheeks strongly converging toward the mouth, the frontal surface depressed medially, the occiput concave, the temples not very wide and with the posterior angle rounded. Clypeal margin with a moderately large and deep semicircular emargination with a median tooth. Vertex a little more than one-half as wide as whole head, the ocelli forming a very obtuse angle. Thorax of usual structure, except the surface of metanotum and propodeum, as seen in profile view, is very strongly declivous and forms an angle of about 110 degrees with plane of mesonotum. Propodeum transverse and without a distinct neck at apex. Abdomen much compressed, deeper dorso-ventrally than broad, fusiform in outline as seen from above, broadest between the base and the middle and very acutely pointed at apex; petiole short and with a small prong or tooth on each side near middle, the part behind the prongs slightly wider than long, the anterior part much narrower but about as long as posterior part.

Antennae inserted very close together on middle of face, the sockets less than their own diameter apart, the scapes when in position in the scrobal depression touching each other nearly to their bases. (In most species of *Pachyneuron* the scapes in such position diverge toward their bases, as the sockets are more widely separated.) Scape slender, cylindrical, not nearly reaching to anterior ocellus; pedicel about one-half longer than wide; funicle joints about as thick as long, the first joint not ring-joint-like; club joints, except apical one, a little wider than long; flagellum moderately increasing in thickness distad. Left mandible tridentate, the right quadridentate. Maxillary palpi four-jointed, the labial palpi three-jointed.

Wings of usual shape, but rather small and hardly surpassing apex of abdomen. Discal setae moderately dense, very short and absent on area

beneath submarginal vein; marginal fringe very short and absent on apical margin. Marginal vein about twice as wide at apex as at base and a little more than twice as long as wide at apex; stigmal vein distinctly longer than the marginal, apical knob small, rounded and with a distinct prong directed toward apex of postmarginal vein; postmarginal vein somewhat longer than the stigmal.

Sculpture of the usual reticulate type and the lower part of face with converging striae. As compared with *P. virginicum* Girault, the reticulations are finer, nearly uniform in size and not distinctly coarser on middle of mesoscutum as in that species. Portion of pleura behind the oblique, strong angulation reaching from base of tegulae to anterior margin of base of middle coxae, reticulate on the antero-inferior half but entirely smooth on remaining part. Hind coxae, propodeum, petiole and gaster of abdomen smooth and polished. Propodeum with two pairs of foveae on each side of the middle, the basal pair rather close to the spiracular sulcus, the apical pair much closer together. Area enclosed by the foveae delicately reticulate but shiny; the area on each side between foveae and spiracular sulcus polished; the area exterior to the spiracular sulcus very minutely sculptured and not quite as shiny as rest of propodeum.

Pubescence nearly obsolete, except for a short fringe of whitish hairs on sides of propodeum, short, fine setae on sides of apical part of abdomen, and the usual minute setae on legs and antennae.

Body shining black, with a more or less bluish tint but without any metallic luster, except slightly on pleura and more distinctly on abdomen. Scape brownish yellow, pedicel shining dark brown, the flagellum dull fuscous with grayish pubescence. Front and middle coxae and femora brownish fuscous, the hind coxae and femora similar but with a purplish blue luster; apex of all the femora narrowly, base and apex of tibiae and the tarsi except apical joint yellowish white; front tibiae otherwise yellowish or pale brown, the middle tibiae and the hind tibiae, except narrowly at base and broadly at apex, brownish fuscous. Wings hyaline; marginal vein and knob of stigmal vein fuscous, the remainder of venation paler.

Length of body, 1.52 (to 1.99); length of head, 0.474; width of head, 0.556; width of mesoscutum, 0.478; length of antenna (without the short radicle joint) 0.577; length of fore wing, 1.035; width of fore wing, 0.530 mm.

Redescribed from the following material: two females reared from puparia of *Leucopis nigricornis* Egger, Honolulu, Oahu, August, 1919 (H. T. Osborn); one female reared from same host at Honolulu, September 14, 1919 (Timberlake); two females reared from material of *Lecanium corni* Bouché, San Gabriel Canyon, California, July 13 to 20, 1911 (Timberlake); two females reared by the writer from material of *Pseudococcus auri-*

lanatus (Maskell), Santa Ana, California, October 25, 1911 (Roy K. Bishop); one female, San Diego, California, October, 1914 (C. P. Clausen); one female reared from material of *Pseudococcus adonostomae* Ferris, collected near San Diego, California, September 10, 1920 (Ferris); one female reared from *Leucopis bella* Loew, Riverside, California, August 4, 1924 (H. Compere); and one female reared from *Leucopis* sp. on *Aphis atriplicis* Linnaeus, Salt Lake City, Utah, September 1, 1914 (Timberlake). I do not have much doubt that the parasites reared from coccid material really issued from *Leucopis* puparia, as *Leucopis* is known to have been present in the material handled by the writer.

One specimen from Honolulu differs from the other specimens in having the mandibles with only two and three teeth, the labial palpi with only two joints and the parapsidal furrows less evident.

Encyrtidae.

Aphycus terryi Fullaway.

Mercet has shown (Eos, Rev. Esp. Ent. 1, p. 15-18, March 30, 1925) that *Aphycus terryi* is congeneric with *A. apicalis* (Dalman), hence the genus *Pseudococcobius* falls as a synonym of *Aphycus*.

Metaphycus alberti (Howard) and **Metaphycus claviger** (Timberlake).

These two species belong, I believe, to the group *Euaphycus* Mercet, which Mercet has recently elevated to generic standing. I am, however, skeptical of the validity of *Euaphycus* and prefer to group the species of *Euaphycus* and *Metaphycus* under the latter name.

Aphelinidae.

Prospaltella bicolor n. sp. Figure 1.

Easily distinguished from most described species of *Prospaltella* by the piceous color and yellowish white scutellum. In Girault's table of Australian *Coccophagus* (1915) it runs to *P. clariscutellum* (Girault), from which it differs by having only the scutellum yellowish white and the wings without a cross band.

It differs from *P. peruviana* Rust by the piceous instead of brownish yellow color, the wings almost uniformly and faintly tinted with fuscous, etc.

Female. Head broader than long, rather thin fronto-occipitally, well rounded on sides and below, more transverse above, and distinctly less broad than the thorax. Vertex rather more than one-third the total width of head. Antennae of ordinary length. Scape slender, a little fusiform, the radicle comprising a little more than one-fourth the total length, the scape proper about as wide as the third funicle joint. Pedicel about twice as long as thick and about equal to the second or third funicle joint. First funicle joint much shorter than pedicel or following joints and just barely longer than wide; next two funicle joints subequal, but increasing slightly in width distad, each somewhat less than twice as long as the first. Club slightly wider than funicle, the first joint barely shorter than the second, the third distinctly the longest and tapering to a rather acute point. Flagellum as a whole a little fusiformly swollen and widest at second joint of club. Thorax of normal structure, the scutellum much broader than long, broadly rounded on apical margin and slightly rounded on basal margin. Abdomen nearly as long as thorax, subovate and rather broadly rounded at apex. Ovipositor a little protruded, sometimes protruded nearly one-fifth the length of abdomen, its prominence apparently depending on various degrees of shrinkage. Fore wings moderately narrow; very narrow and of nearly uniform width to end of submarginal vein, then gradually widening, about equally on each side, to end of venation, and from there to apex widening distinctly more on costal side of disk; the apex evenly rounded. Discal setae very distinct, of a moderate degree of sparsity, becoming slightly denser near base of marginal vein and nearly absent on narrow area of disk below submarginal vein. Marginal fringe short, the longest setae not more than one-sixth the width of disk. Marginal and submarginal veins about equal, stigmal vein longer than in most species, appearing at low magnification almost as a direct continuation of the marginal, nearly as wide as marginal for a little more than half its length, tapering much on apical part and recurved toward costal margin. Hind wings nearly as in Masi's figure of *P. berlesei* (Howard), but with the discal setae a little sparser.

Thorax moderately shiny, the mesoscutum distinctly but very finely reticulate, the scutellum indistinctly reticulate; abdomen smooth and very shiny. Eyes rather densely covered with short, erect setae. Vertex and mesoscutum with only a few setae, those on the scutum being rather coarse. Scutellum provided with two pair of fine, moderately long setae. Apex of ovipositor sheaths with a ring of very fine, short, spreading setae.

Body piceous, or slightly brownish piceous in part, the scutellum pale yellowish white. Antennae, legs and mesosternum rather pale yellow, the flagellum a little dusky, and the hind femora sometimes slightly infuscated toward base. Wings almost clear, being very slightly and almost

uniformly tinted with fuscous; veins pale fuscous, except submarginal which is nearly colorless.

Length of body (0.517 to 0.591) 0.555; length of antenna, 0.461; length of scape, 0.154; length of pedicel, 0.050; length of first joint of flagellum, 0.028; length of fore wing, 0.631; width of fore wing, 0.262; length of marginal fringe of fore wing, 0.041 mm.

Described from eighteen females (holotype and paratypes) reared from *Aspidiotus cydoniae* Comstock, on sugar-cane, Honolulu, Oahu, March 17 to April 1, 1924 (Swezey); one female (paratype) collected in Honolulu, December, 1908 (Doctor Perkins); one female (paratype) reared January 19, 1916, from coccid material on *Straussia*, Tantalus, Oahu (Timberlake); and one female (paratype) collected from *Dubautia*, Mount Kaala, Oahu, May 18, 1920 (Timberlake).

P. bicolor is very similar in size and coloration to another Hawaiian aphelinid, *Pseudopteroptrix imitatrix* Fullaway, but the latter species has marginal fringe longer, the stigmal vein without a long beak, the tarsi four-jointed, etc.

Prospaltella transvena n. sp. Figure 2.

In Mercet's key to *Prospaltella* (1912) and in Doctor Howard's key (1908) *transvena* runs to *P. maculata* (Howard), but is decidedly different from that species in coloration and in many other ways. In Girault's key of Australian species (1915) it comes very near *P. sophia* (Girault and Dodd), but the second funicle joint is distinctly, although not very much, longer than the first funicle joint or the pedicel. Other species of *Prospaltella* that are entirely, or almost entirely, yellow are *P. lahorensis* Howard, *P. leucaspidis* Mercet, *P. lutea* Masi, and *P. clara* (Dodd), but *transvena* is different from these in antennal and wing characters.

Female. Head about as wide as thorax, thin fronto-occipitally, much broader than long, the outline strongly rounded and with the cheeks converging in a broad curve to the mouth. Eyes rather small, protuberant. Vertex nearly one-half the total width of head. Antennae about as long as thorax and abdomen combined, slender, nearly filiform but with the club slightly wider than the funicle. Scape about as long as pedicel and first two funicle joints combined, cylindrical and a little swollen at middle of the scape proper, the radicle joint about one-third the total length. Pedicel about twice as long as thick, as long as first funicle joint and considerably wider than any of the funicle joints. Funicle joints much

longer than wide, the middle one longest and nearly thrice as long as wide, the first joint slightly shorter than the third and nearly two and one-half times as long as wide. Club a little longer than the funicle, the middle joint a little the longest and widest and nearly twice as long as wide, the other two fully twice as long as wide and the apical one gradually tapering to a rounded point. All joints of flagellum, except first funicle joint, provided with fine linear sensoria running the whole length, or almost, of the joints, there being about one on each of the last two funicle joints and two or three on each joint of club. Thorax practically as in *P. bicolor*. Abdomen as long as thorax, rather rounded at apex and with the ovipositor slightly protruded. As in many other small species of *Prospaltella* and *Encarsia*, both thorax and abdomen are fully as deep dorso-ventrally as broad.

Fore wings rather narrow, perfectly straight along costal margin from a point about one-fourth the length of wing from its apex to the proximal end of marginal vein, which meets the submarginal in a very obtuse angle; posterior margin of wing nearly straight from the base to a point opposite apex of marginal vein and then gently curving to the rounded apex of disk. Discal setae, as compared with *P. bicolor*, very fine and rather dense, but comparatively inconspicuous, and absent on area beneath submarginal vein; submarginal row of discal setae distinctly longer than the rest, especially on the posterior margin of disk just beyond the crease. Marginal fringe one-third as long as width of disk. Marginal vein slightly longer than the submarginal and provided with about seven bristle-like setae in addition to two smaller setae at base. Apical truncation of marginal vein variable but generally more or less square. Stigmal vein short and wide, a little wider than marginal vein and nearly a half longer than width of marginal at its apex; shaped like a bird's head, with a short beak, the outer margin slightly curving toward costal margin at apex and forming a more or less gradual curve at base with apex of marginal vein. Hind wings extremely narrow and very acute at apex, being considerably narrower than in *P. berlesei* (Howard); discal setae very sparse and forming hardly more than one longitudinal row; marginal fringe not very long, yet distinctly longer than width of disk.

No sculpture discernible under high magnification. Vertex and mesonotum provided with sparse fine setae. Collar of pronotum with a row of fine setae, one of which on each side is considerably enlarged. Setae of mesoscutum arranged more or less distinctly in three transverse series, the third series composed of two long, bristle-like setae near the posterior margin. Scutellum provided as usual with two pairs of long, bristle-like setae.

Head, thorax and abdomen orange yellow, without any fuscous markings, the sternum, venter, legs and antennae much paler yellow, the antennae becoming slightly dusky at apex. Eyes dark red, the ocelli carmine. Wings perfectly clear, the veins pale yellowish, the discal and marginal setae very pale or nearly colorless.

Length of body (0.364 to 0.704) 0.589; length of antennae, 0.483; length of scape, 0.134; length of pedicel, 0.042; length of second funicle joint, 0.055, length of entire funicle, 0.145; length of entire club, 0.160; length of fore wing, 0.589; width of fore wing, 0.223; length of marginal fringe of fore wing, 0.074 mm.

Male. Similar to the female in many respects, but the antennae quite different and the coloration much duskier. Antennae, in usual slide mount, nearly as long as body. Scape slightly slenderer than in female and a little curved, the radicle joint composing about one-fourth the total length. Pedicel hardly one-half longer than thick, about one-half as long as following joint, and with fine, longitudinal, nearly parallel, or only slightly anastomosing striae. Flagellum six-jointed, filiform, without a distinctly differentiated club; first five joints nearly equal in length and width, the first somewhat more than twice as long as wide, the fifth about two and one-half times as long as wide; apical joint about one-fourth shorter than preceding joint and conically tapering to the blunt apex. Flagellum provided with prominent, longitudinal, linear sensoria extending almost the whole length of the joints, with apparently about seven on each joint, of which three to five are visible in the same focal plane, but the apical joint with only two or three altogether. Wings nearly as in female in regard to shape, length of marginal fringe, etc., but the stigmal vein considerably longer, being nearly twice as long as width of marginal vein at apex. Outer margin of stigmal vein almost straight and parallel with costal margin, the beak consequently obsolete, the base forming a gradual and more distinct curve with apex of marginal vein than in female.

Vertex and upper part of frons with distinct, transverse striations, the striae in front of median ocellus suddenly bent and convergent toward ocellus, those within the ocellar triangle triangularly disposed and with at least three running from each posterior ocellus to the median ocellus. Pronotum finely reticulate; infuscated anterior part of mesoscutum and the parapsides coarsely reticulate. Other parts of body without sculpture. Setae on vertex a little coarser than in female.

Body orange yellow, the face and under parts clear pale yellow, the center of occiput, pronotum, anterior border of mesoscutum, small blotch on parapsides, sides of propodeum and tergum of abdomen more or less infuscated, the dark parts generally being most prominent on the mesoscutum and abdomen. Scape clear yellow, the flagellum dusky yellow. Legs, including coxae, clear pale yellow. Wings hyaline, but appearing slightly darker than in female on account of the fuscous setae; margin of disk of fore wing very narrowly but distinctly infuscated on apical half; membrane of disk perceptibly infuscated at narrow part opposite apex of submarginal vein; veins slightly dusky. Eyes and ocelli as in the female.

Length of body (0.405 to) 0.828; length of antenna, 0.555; length of scape, 0.091; length of pedicel, 0.043; length of first joint of flagellum, 0.070; length of fore wing, 0.619; width of fore wing, 0.244; length of marginal fringe of fore wing, 0.072 mm.

Described from two females and one male (holotype female, allotype and paratype) reared from *Asterochiton vaporariorum* (Westwood), on tomato, Honolulu, Oahu, June 20, 1916 (Timberlake); seventeen females and two males (paratypes) reared in January and February, 1915, from *Pealius hibisci* (Kotinsky) on hau tree, Waikiki, Honolulu (Osborn); sixteen females and one male (paratypes) reared from *Pealius hibisci* on hibiscus, Honolulu, November, 1923 (Giffard); five females (paratypes) swept from grass at Pearl Harbor Peninsula, Oahu, July 4, 1919 (Swezey); two females (paratypes) on hau tree, Waikiki, Oahu, June 22, 1925 (Swezey); three males (paratypes) reared from *Aphis sacchari* Zehntner on sugar-cane, Honolulu, February 27 to 28, 1925 (Swezey); one male (paratype) reared from *Pealius hibisci* on hibiscus, Hilo, Hawaii, January, 1918 (Timberlake); and one male (paratype) reared from coccid material on coffee, but presumably from an aleyrodid, Kona, Hawaii, December, 1915 (Pemberton).

There are also specimens in the United States National Museum reared by Koebele from an aleyrodid on coffee at Olaa, Hawaii, in December, 1898; and specimens in Mr. Swezey's collection reared at Honolulu from *Asterochiton sonchi* (Kotinsky) on *Sonchus*. It is the species No. 80 and 82 of my list of chalcid-flies of the Hawaiian Islands, which prove to be the same on careful study.

Aphytis chrysomphali (Mercet).

A study of Hawaiian specimens of *A. limonus* (Rust) and Californian specimens of *A. quaylei* (Rust) convinces me that it will be necessary to consider both species synonyms of the earlier described *A. chrysomphali* (Mercet).

Coccophagus hawaiiensis n. sp. Figure 3.

Coccophagus hawaiiensis W. G. Wait, 1893, Planters' Monthly, 12, p. 562 (no description).

Coccophagus hawaiiensis Riley and Howard, 1894, Insect Life, 6, p. 334 (no description).

Coccophagus lecanii Ashmead, 1901 (not Fitch), Fauna Hawaiiensis, 1, p. 328 (excluding description).

This species is closely allied to *C. lecanii* (Fitch) and to

C. japonicus Compere. The characters separating the three species may, perhaps, be more easily understood by means of the following table:

1. Middle legs not entirely pale..... 2
   Middle legs, except a greater part of coxae, pale yellow; coxae, except apex of middle and hind pair, and hind femora, except at base and apex, piceous, the front femora and tibiae sometimes more or less dusky; antennae, including scape, piceous.
   japonicus Compere

2. Scape fuscous or piceous, the flagellum brownish yellow, coxae, except extreme apex of middle and hind pair, and femora, except more or less at base or apex, pale yellow, the hind tibiae more or less fuscous on basal third, remainder of legs, except apical joint of tarsi and slight infuscation on front tibiae, pale yellow.
   lecanii (Fitch)

   Scape dusky yellowish, the flagellum piceous, middle and hind coxae and hind tibiae yellowish white, the front coxae and front femora, middle femora and tibiae in large part and hind femora, except the basal third, more or less brownish or fuscous; antennae longer, the first funicle joint more than twice as long as wide.
   hawaiiensis n. sp.

Female. Of the form and structure of *C. lecanii* (Fitch), but slightly more robust and apparently a little larger. Scape slender, subfusiformly cylindrical and somewhat longer than the two following joints combined. Pedicel about one-half longer than thick and a little more than one-half as long as the following joint. Funicle joints all longer than wide, the first one longest, about one-third longer than the third joint and rather more than twice as long as wide, the third joint somewhat more than one-third longer than wide. Club about as long as the last two funicle joints and one-third of the first combined, the basal joint about as long as the preceding joint and a little wider, the next two joints subequal in length and a little shorter than the basal joint, the third joint conically tapering to the blunt apex. Joints of the flagellum provided with fine longitudinal sensoria, most numerous on the club. Thorax about one-sixth longer than wide and having the usual structure. Wings similar to *C. lecanii*, but the marginal vein rather longer than submarginal, the postmarginal vein almost as long as the stigmal, and the stigmal vein about twice as long as wide, tapering into a rather long apical process or beak and the outer margin almost parallel with the costal margin . (In *lecanii* the stigmal vein is nearly equilaterally triangular, or hardly longer than wide and without a distinct apical prolongation. In *japonicus* the stigmal vein is similar to *hawaiiensis*, but less elongate and less nearly parallel with the wing margin). Disk of fore wing with a small roundish bare spot

near posterior margin a little beyond a point opposite base of marginal vein.

Sculpture and pubescence practically as in *lecanii*, the scutellum having three pairs of discal setae, of which the pair close to apical margin is much the largest. Eyes rather more densely and conspicuously pubescent than in *lecanii*.

Body black and rather shiny on thorax and abdomen, the thorax beneath somewhat brownish; scutellum except basal third, and the very narrow metanotum, yellow. Scape dusky yellowish, the pedicel and flagellum piceous. (In *lecanii* the flagellum is paler and more yellowish than the scape). Legs pale yellow or yellowish white, the front coxae, front femora, although paler at apex, middle femora, except narrowly at base, middle tibiae, although more dilutely toward base, and hind femora, except basal third, more or less brownish or fuscous. Wings hyaline and very faintly tinged with fuscous; veins yellowish.

Length of body (0.92 to) 1.15; width of mesoscutum, 0.469; length of thorax, 0.550; length of antenna, 0.738; length of scape, 0.200; length of pedicel, 0.064; length of first funicle joint, 0.104; length of club, 0.194; length of fore wing, 0.981; width of fore wing, 0.457 mm.

Described from nine females (holotype and paratypes) reared from *Saissetia nigra* Nietner, Honolulu, Oahu (Doctor Perkins). The derm of the host is hardly blackened by the parasite.

Eulophidae, Tetrastichinae.

Melittobiopsis new genus.

Melittobiopsis differs from *Melittobia* Westwood by having only two funicle joints and by having the male similar to the female. It differs from *Thripoctenus* Crawford by having a long conical prothorax, no postmarginal vein, the submarginal not greatly shorter than the marginal vein, the marginal fringe of wings rather short, the antennae shorter and much stouter, with the club distinctly three-jointed in the female, the mandible large and with seven teeth diminishing in size inwardly, the parapsidal furrows complete and distinct, the scutellum much broader than long and much shorter and smaller than the mesoscutum. It differs from *Winnemana* Crawford by having no grooves on the scutellum, the prothorax conical, the antennae seven-jointed, without a distinct ring joint, the stigmal vein only about one-fifth as long as the marginal, and the propodeum without a median carina.

Type of genus: *Melittobiopsis ereunetiphila* n. sp.

Female. Head strongly depressed, somewhat longer than wide, well rounded at each end and less rounded at the sides. Eyes narrow, elongate, about three-fourths as long as head and not quite reaching to posterior margin. Space between eyes very broad, occupying almost all of the dorsal surface of head, and considerably sunken in after death. Medially there is a fold or soft-walled groove, forking anteriorly near middle of head and reaching from the anterior ocellus to each antennal socket. Antennal socket situated about one-third the width of head apart in front of ocular line and rather close to clypeal margin. Antennae short, not very much longer than the head, rather strongly clavate, and composed of seven joints, not counting the well-developed pseudanellus with a distinct capitulum. Scape rather stoutly fusiform and considerably longer than the pedicel and funicle joints combined. Pedicel large, more than twice as long as wide, about one-third as long as scape and a little longer than the funicle joints combined. Funicle two-jointed, the first joint distinctly wider than long, the second considerably larger than the first and only slightly wider than long. Club large, ovate, rounded at base and rather pointed at apex, much wider than funicle and nearly as long as pedicel and funicle combined, and distinctly three-jointed, with the first two joints wider than long. Second funicle joint and joints of club provided with well separated, linear, longitudinal, corneous sensoria, of which about 2, 2, 4, and 3 are visible in one focal plane on the respective joints beginning with the second joint of funicle. Mandibles rather large, provided with two relatively large outer teeth and five short blunt teeth on the oblique inner margin. Palpi extremely short, the maxillary pair two-jointed, the labial pair one-jointed.

General form moderately slender and strongly depressed. Thorax fully twice as long as wide and almost as wide as head. Prothorax conical and almost as long as the mesoscutum. Mesonotum without grooved lines, but the parapsidal furrows of scutum well developed and complete. Scutellum nearly twice as broad as long and roundingly subtruncate at apex. Propodeum without a median carina, transverse, a little shorter medially than at the sides, the posterior margin bisinuate; spiracles minute and circular. Abdomen relatively large, slightly longer than head and thorax combined and wider than thorax, broadest beyond the middle, sessile at base, and composed of seven nearly equal segments. Ovipositor not protruded, inserted nearly at the middle of the venter, the spicula stout, ensiform and slightly curved on inner margin.

Fore wings narrow, moderately long and reaching a little beyond the apex of abdomen. Marginal fringe about as long as one-fourth of the width of disk; discal setae short and moderately dense, but becoming nearly absent on area beneath submarginal vein. Venation reaching well beyond the middle of costal margin, but not nearly to apex; submarginal vein about three-fourths as long as marginal; postmarginal vein absent; stigmal vein about one-fifth as long as marginal, not much enlarged at apex but provided with a distinct spur or uncus which is directed obliquely

toward costal margin. Submarginal and marginal veins provided with rather long, slender setae, of which there are about four and nine, besides several shorter setae, on each respectively. Hind wings about one-third as wide as fore wings and rather well rounded at apex; marginal fringe about one-half as long as width of disk and a little shorter than fringe of fore wings; discal setae of about the same density as on the fore wing. Legs rather short and stout, the femora a little swollen, the four-jointed tarsi all shorter than their tibiae, and the hind coxae large.

Male. Very similar to the female, but differing as follows: Head more nearly circular in outline; the antennae a little less strongly clavate, the two funicle joints equal in size, the club with the two basal joints almost completely fused, but with a remnant of the suture remaining on one side, encircling at most not more than one-fourth of the circumference of the joint. Sensoria of flagellum rather more numerous, with about 4 on first funicle joint, about 7 on second, about 12 on the fused basal joint of club, and about 5 on the apical joint; two of the sensoria on basal joint of club much thicker than the others, and several continue across the region where the suture would be expected to lie if it were complete. Abdomen smaller than in the female, oval, strongly depressed, about twice as long as wide and as long as head and thorax combined. Wings relatively longer than in the female.

Melittobiopsis ereunetiphila n. sp. Figure 4.

Female. Face finely reticulate and duller than rest of head and body; pronotum and mesoscutum finely reticulate and shiny; abdomen distinctly and comparatively coarsely reticulate; cheeks, scutellum, metanotum and propodeum smooth and very shiny. Cheeks and occiput with fine, moderately short setae, the pronotum with similar setae, but about six setae on posterior margin of pronotum, three pairs on mesoscutum, two pairs on scutellum and rather numerous setae on lateral margins of abdomen considerably longer and about equaling those on marginal vein of wings.

Shining submetallic bluish black, the head somewhat greenish, the thorax with a somewhat brassy luster, especially on pronotum and propodeum. Antennae piceous, the scape dusky yellow, except on dorsal margin of apical half. Legs piceous, the tibiae and tarsi yellowish. Wings hyaline, slightly and uniformly tinted with fuscous, veins dusky yellowish.

Length of body (0.85 to) 1.18; length of head, 0.265; width of head, 0.247; width of mesoscutum, 0.232; length of antenna, 0.389; length of fore wing, 0.744; width of fore wing, 0.263 mm.

Male. Hardly differing from the female, except as indicated in the generic description, and the scape much less yellowish.

Length of body, 0.764; length of head, 0.242, width of head, 0.232; width of mesoscutum, 0.214; length of antenna, 0.349; length of fore wing, 0.731; width of fore wing, 0.265 mm.

Described from twenty females and one male (holotype female,

allotype and paratypes) reared from larvae of *Ereunetis flavistriata* Walsingham, on sugar-cane, Honolulu, Oahu, January 3 to 9, 1924 (O. H. Swezey); and one female (paratype) from same host on coconut, Grove Farm, Kauai, September 13, 1907 (O. H. Swezey).

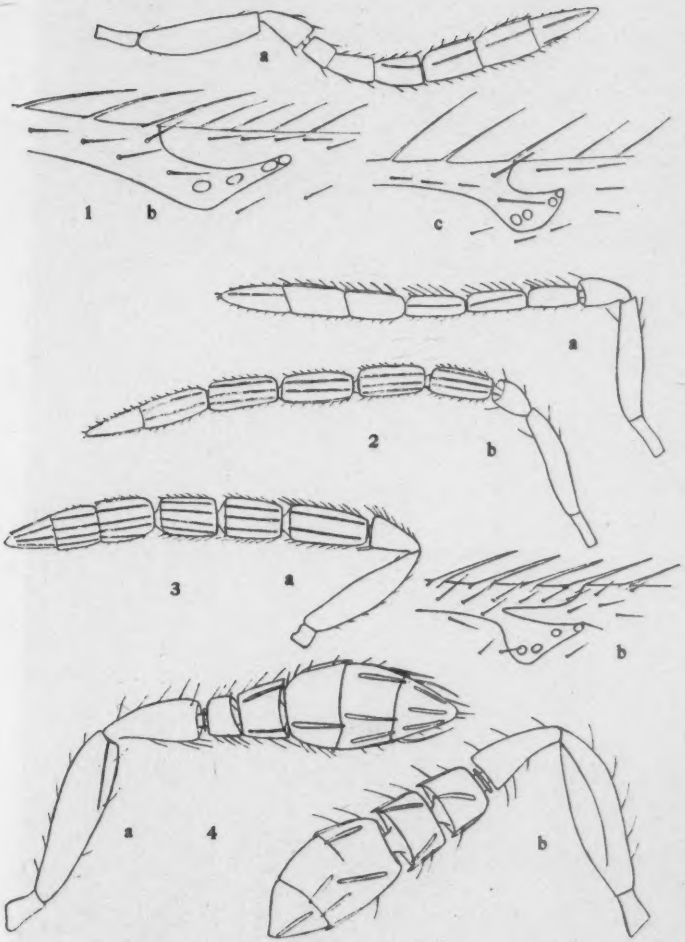
EXPLANATION OF FIGURES.

Fig. 1. *Prospaltella bicolor.*
- a. Antenna of female.
- b. Stigmal vein of female.

Fig. 2. *Prospaltella transvena.*
- a. Antenna of female.
- b. Antenna of male.
- c. Stigmal vein of female.

Fig. 3. *Coccophagus hawaiiensis.*
- a. Antenna of female.
- b. Stigmal vein of female.

Fig. 4. *Melittobiopsis ereunetiphila.*
- a. Antenna of female.
- b. Antenna of male.



Hawaiian Chalcid-Flies

Some Remarks on Dr. Hem Singh-Pruthi's Paper on the Morphology of the Male Genitalia in Rhynchota.*

BY F. MUIR.

Dr. Hem Singh-Pruthi's paper is a valuable contribution to this subject, for which all Hemipterists should be thankful. For the first time descriptions and drawings of the male genitalia of a number of Heteroptera, representing most of the families of that suborder, have been presented to Hemipterists. Many Homoptera have been worked on and illustrated by several workers so that the part of his paper dealing with them is not of such novel interest, but the work on them is of value, as many forms not hitherto illustrated have been used. The labor of dissecting, drawing and describing such a number of types is great, and the author of such a work is to be congratulated and thanked for all his labor. The chief value of such a work in a field wherein such a little has been done lies in the detail descriptions and drawings. Generalizations as to comparative morphology, phylogeny, and classification are of value if we remember that they are likely to be rather premature, for our knowledge is not extensive enough for final conclusions.

Generalizations on insufficient data are evident in a number of cases. Thus the single species he took as typical of the Achilidae belongs to the Meenoplidae, and so he failed to recognize the peculiar type of genitalia possessed by the Achilidae. A closer study of what had already been published would have prevented this mistake.

In the Delphacidae all the figures and descriptions are of species belonging to the Delphacinae. He mentions *Ugyops kellersi* of the Asiracinae, but passes it over. It has been pointed out that the latter subfamily is the more generalized, and their genitalia approach those of the Cixiidae very closely. Had he examined existing literature it would have prevented his generalization of "the part corresponding to the distal region in Cixiidae is aborted and the aedeagus is simple, short and cylindrical," which only applies to the Delphacinae.

Proc. Haw. Ent. Soc., VI, No. 2, July, 1926.

* Trans. Ent. Soc., Lond., I, II, 1925, pp. 127-267.

Talking of the tenth segment he says "in some, e. g., Delphacidae, etc., it is relatively small and ring-like," although a great number, especially of the Asiracinae, have exceedingly large anal segments.

"By the way, it may be mentioned that Cixiidae, etc., unlike the rest of Fulgoroidea, have a complete ovipositor like Cicadidae, Jassidae, etc.," would not have been written had he consulted works he cites, for it is only a minor portion of the Cixiidae that have such an ovipositor and all the Delphacidae have it. Some other families have a complete ovipositor specialized along lines of their own.

In several places he states that Cicadidae have no parameres, although he examined *Tettigarcta ciliata* which he states has "a pair of appendages that look like parameres." As they hold the right position and in every way conform to parameres, why refuse to admit them as such, except to be able to generalize on the point. This species is of great interest, as the male possesses no sound-producing organ and the wing venation is decidedly primitive; it is the most generalized cicadid living, and must be considered when considering the origin of the family. Whether the small appendages on the sides of the pygofer in cicadids are rudiments of the genital styles, as Muir and Kershaw suggested, or not, is a point that he brings no evidence to bear upon, for rudiments are not likely to have a connection with the "basal plate." The absence of parameres in the majority of this family is a specialization and not a primitive condition. The same can be said for the Coccidae, and so the absence of these structures cannot be used to place these two groups together.

Singh-Pruthi generalizes on a single species of Tettigometra although it has been shown that this small family has more than one type of male genitalia.

He states that "the Fulgoroidea also have no subgenital plates." But the ventral margin of the pygofer in a very large number of Fulgoroidea have two processes, and others have a single process, sometimes showing signs of bifurcation. Why are these not subgenital plates? Elsewhere he states "the subgenital plates present in almost all other Homoptera are not developed in Cicadidae."

On page 242 he remarks that "basal plates are present in all

the families with the exception of Coccidae," and on page 202 he says the Cercopidae "are characterized by the total absence of the basal plates."

Turning to the purely morphological portion of the paper, there are three points upon which I must differ from Singh-Pruthi, viz., the origin of the aedeagus, the homology of the genital plates, and the homology of the basal plates.

He remarks "throughout the order the aedeagus is a sort of diverticulum or a backward continuation of the body wall between the ninth and tenth sternites." Most workers who have studied this subject have concluded that this organ arose as a pair of small processes (median gonopophysis) situated between another pair of processes (posterior gonopophysis). These are considered by some as representing the endopodites and exopodites of the ninth sternite, and are homologous with the two posterior median and posterior appendages of the ovipositor. In *Philaenus leucophthalmus* (Linn.) Kershaw and Muir have shown that the median processes are directly homologous with a pair of spines at the apex of the adult aedeagus. While, for several reasons, I would be quite pleased to accept Singh-Pruthi's interpretation, yet a number of facts are against it.*

I have recently written ** on the present status of the genital plates, but as Singh-Pruthi has placed so much weight upon his own interpretation and has labeled Kershaw and Muir's as a "morphological paradox," I feel obliged to remark upon the subject again.

Singh-Pruthi starts with the belief that the ventral portion of the pygofer is the ninth sternite, which is the very point that I question. Until that point is definitely settled, my position is as logical as his. I claim that the development of the male is exactly similar to the development of the female, where the anterior processes of the ovipositor pertain to the eighth sternite, but during ontogeny they are "let loose" from the segment and take up a position closely in relation with the *ninth tergite;* it is also divided into two portions, the valvifer and the ventral valva.

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* See note at end; Singh-Pruthi's conclusions from the development is equally unacceptable to me.

** Proc. Haw. Ent. Soc., VI, pp. 41-45 (1925).

As an example as to the distance these appendages of the apex of the eighth sternite can depart from their point of origin, I refer to *Diapheromera femorata.*

In describing the development of the ovipositor in Orthopteroid insects Walker says: * "The ventral valvulae arise primitively from the posterior margin of the eighth sternum, though often actually from the intersternal membrane between segments eight and nine; the dorsal and inner valvulae from the ninth sternum, primitively also from the posterior margin."

In the adult female Homopteron the ninth sternite is represented by a small sclerite on each side, the valvifer, as it is in Orthoptera. In some forms, i. e., *Flaccia conspersa* Stal,[1] the large, flat, subtriangular ventral valvulae (anterior processes of ovipositor) are separated from the eighth sternite by a fairly large membrane, their bases being connected together by a thin strip of chitin which is quite distinct from the eighth sternite. (Figure 5, *d.*)

Many writers consider that the posterior and middle processes are homologous in both sexes. I claim that the anterior processes are also homologous.

In the male Homopteron the *ninth sternite has never been demonstrated;* it is therefore difficult to decide whether the gonopore lies before or after it.

The contention that in the female the ventral valvulae arise from the posterior margin of the eighth sternite and in the male the genital plates arise from the intersternal membrane does not prove that these organs are not homologous. Walker states that in Orthoptera the ventral valvulae arise "often actually from the intersternal membrane"; in all cases they soon take up a position on the intersternal membrane posterior of the eighth segment, a position held by the genital plates.

In *Eurymela*[2] we find the genital plates in the male connected

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* Am. Ent. Soc. Amer., XII (1919), p. 274.

[1] This is synonymous with *Lyricen imthurni* Kirk.

[2] Singh-Pruthi looks upon this as a specialized genus in which the basal plate is "reduced"; whereas I consider it as generalized on account of a number of structures which place it nearer to the Cercopidae than the vast majority of the Jassidae.

at their bases by a thin strip of chitin in a manner similar to which we find in the ventral valvulae in the female *Flaccia conspersa* Stal, where we know that it is not the ninth sternite. This is the structure which in more specialized forms is termed the "genital valve" and which is sometimes amalgamated to the genital plates and forms the ventral portion of the male pygofer.

The whole structure is so similar in the two sexes in origin and development that it seems quite reasonable to consider them homologous. Why a process which is acknowledged to be the ordinary development in the female should be called a "morphological paradox" in the male is past understanding.

If the ventral portion of the pygofer is the ninth sternite and the genital plates new processes not represented in the other sex or in other insects, should this not be more evident in the generalized forms?

Among the generalized Cicadoidea (which are among the most generalized of the Homoptera) we find the genital plates large and free with a very small strip of chitin connecting their bases; in the more specialized forms the basal portion is larger, the genital plates amalgamated to it and to one another, forming a large ventral plate more or less with two posterior processes; in the Fulgoroidea (still more specialized forms) this process is carried still further and a ring-like pygofer is formed, often with no signs of the genital plates. Thus the whole process is reversed to what it should be if we consider the ventral portion of the pygofer as the ninth sternite and the genital plates as belonging to that sternite.

In some of the Fulgoroidea the eighth sternite is partly or wholly incorporated into the ventral wall of the pygofer. In the Derbidae we find an interesting reduction of the abdominal segments. In *Lamenia caliginea* Stal the eighth sternite is suppressed or incorporated into the pygofer, the seventh meeting the pygofer; in *Lydda elongata* (Fab.), Figure 1,* the median portion of the seventh is suppressed so that the sixth comes next to the pygofer. Singh-Pruthi figures the ninth tergite in Derbidae as forming the dorsal portion of the pygofer in the same manner as it does in Cixiidae, etc. This is never the case as far

* This is synonymous with *Philadelphia pandani* Kirk.

as I know. The ninth tergite is not recognizable as a distinct sclerite, but appears to be fastened onto the base of the anal segment. In *Lamenia caliginea* (Figures 3, 9) this basal portion is fairly well differentiated, but in *Lydda elongata* (Figures 2, 9) and *Zeugma monticola* Kirk. (Figures 4, 9) there is no defined line of demarcation. This condition has been figured by me in *Phaciocephalus* sp.,[1] and it appears to be characteristic of the family.

Singh-Pruthi has placed great stress upon his recognition of the homology of his "basal plates" in Heteroptera and Homoptera, and remarks: "So far as the available literature shows, nobody has even suspected that the "stirrup"-shaped organ in Heteroptera is the same as the curious V- or Y-shaped structure in Homoptera."[2] After studying his work, I still do not suspect that they are.

In Heteroptera "the basal plates are always in the body wall, surrounding the basal foramen"; from them arise "chitinous ligaments and muscles which at the other end are attached to the base of the visica, and are thus concerned in the evagination or retraction of this organ."[3] If this be the primitive type, then we should expect to find it in a recognizable condition in the most primitive (or generalized) Homoptera. In the Cercopidae (which are very generalized Homoptera) these structures are stated to be absent. In the most generalized Jassidae, such as *Eurymela,* there is a small plate situated between the genital styles; in the more specialized Jassidae this plate is larger and reaches the base of the aedeagus to which it is amalgamated in some species. Without some better proof, such as ontogeny or forms showing the transition stages, I cannot accept Singh-Pruthi's homology of these two structures in Heteroptera and Cicadoidea. I am shy at calling things "morphological paradoxes," as such queer things do take place in nature, or I might be tempted to call this one.

In the Fulgoroidea (with some exceptions) we find a most interesting and puzzling structure which Singh-Pruthi considers

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[1] Pro. Haw. Ent. Soc., V, (2), 1923, p. 240, Fig. 28.

[2] l. c., p. 136.

[3] l. c., p. 135.

to be homologous with the basal plates of Heteroptera. In these insects there is a small plate between the genital styles, as in *Eurymela,* from which projects an apodeme into the body cavity; this apodeme joins, or forms, a large organ which Singh-Pruthi calls the bridge; this bridge is joined to the penis, often by a long tube he calls the sheath. I have used the term "apodeme of genital styles," but it would be better termed the apodeme of the "aedeagus style connective" (Lawson). It is a true apodeme of the small plate between the genital styles.

Singh-Pruthi considers that the sheath, bridge, and apodeme are all one structure having a single origin. While the question can only be settled definitely by studies of development, the evidence at my disposal does not support such an interpretation. In the cixiid *Pintalia* (Figure 6) the sheath appears to be formed by the chitinization of the ejaculatory duct; distally it continues into the complex visica and basally it enlarges to form the chamber, the dorsal and lateral walls of which are membranous. The bridge appears to be a development of this chamber to which the apex of the apodeme of the genital styles is attached; from the bridge the stenazygotic portion of the genital tube continues into the body cavity (Figure 6). Figure 7 represents a diagrammatical longitudinal section of the bridge and chamber. I have been unable to trace any separate ejaculatory duct passing through the chamber or sheath.

In the Derbidae we find some very interesting conditions which are peculiar to the family. In spite of very careful dissection of a number of species and submitting the membrane to various stains, I am unable to find any trace of the apodeme of the genital styles or of the chitinization marked bp. pr. by Pruthi; I feel sure that he has erred in this matter. In spite of the absence of the apodeme of the genital styles, we find in *Phaciocephalus vitiensis* (Figure 8) and some allied species a distinct chamber and bridge which is undoubtedly formed by the apex of the enlarged (eurazygotic) portion of the genital tube. In *Lydda elongata* (Fabr.) there is no chamber or bridge but that portion of the tube is chitinized (Figure 2, *a*). In most other Derbidae even this chitinization is absent and the eurazygos passes into the stenazygos without any distinct line of demarca-

tion or structure. In *Vekunta malloti* Mats. the chamber is about the middle of the periandrium.

Singh-Pruthi's figures of the Derbidae are incorrect and misleading in some other respects. In this family the aedeagus arises from the anterior (ventral) portion of the genital membrane, between the bases of the genital styles and not from the middle or near the anal segment. The large chitinization which connects the base of the aedeagus to the base of the anal tube, which forms such a conspicuous part of the genitalia of this family, he has not figured. I figure *Lamenia caliginea, Zeugma monticola* and *Lydda elongata* = *(Philadelphia pandani)* for comparison with his Figures 255, 256, and 257.

Turning to his taxonomy and phylogeny there are certain points in which I differ from Singh-Pruthi, even when only the genitalia are taken into consideration. The Tettigometridae cannot come off the Cixiidae, they are too generalized and too diverse. I cannot place the same value on the absence or presence of a vesica as he does, because this and adjoining parts are the most protean portions of the male genitalia in Hemiptera and other orders (i. e., Coleoptera), and I cannot delimit the ejaculatory duct from the "penis" in very many cases, any more than I can from the "internal sac" in Coleoptera. His error in regard to Achilidae is due to the unfortunate fact that he did not examine a specimen of this family. Apart from these points his text figure 2 is very close to my own arrangement of the Fulgoroidea. Turning to his text figure 3, I consider the placing of Psyllidae away from Coccidae and next to Fulgoroidea is due to a superficial resemblance. The absence of the internal structure forming the genital apodeme, bridge and sheath in the Psyllidae indicates this. The psyllid type I would derive from the cicadoid type, but highly modified. It is unfortunate that the Aleurodidae and Aphiidae were not also studied.

In discussing function he might have stated that, in the Fulgoroidea, the genital styles function as claspers and are coadapted to portions of the female abdomen.

Because I find it necessary to differ from Dr. Hem Singh-Pruthi in several points of morphology, and have pointed out some inaccuracies in his figures of the genitalia of the Derbidae, I would not like it to be thought that I do not approve of his

paper in general or that I do not appreciate his contribution to the subject under discussion.

NOTE.—Since writing the above I have received a copy of Doctor Singh-Pruthi's paper on the development of the male genitalia in Homoptera [1] for which I have to thank Dr. Hugh Scott. This is an interesting paper, but the part which is of greatest interest to the above discussion is the development of the genital plates. Of these he remarks (p. 63) "the ninth sternum is very short, but is produced posteriorly, without the intervention of any suture, into a pair of triangular, plate-like appendages (gp) which closely touch each other along their mesial margins, except at the extremities; the bases of these appendages are continuous with one another, and flush with the ninth sternum. These appendages are the future subgenital plates. Just above the plates the ninth segment bears another pair of small lobelike processes (pl), one on either side of the median line, and hidden by the plates when seen from the ventral side. These processes will develop into the parameres and the aedeagus; between the bases of these lobes there is a depression of the body-wall, about a pinhead in size, the future gonopore (gnp)." This description is of the late second or early third instar of *Idiocerus populi* or *Idiocerus atkinsoni*. It can be diagrammatically represented by Figure 10.

His descriptions and figures do not uphold this statement, and my objections to it are several:

(1) *Idiocera* is too specialized to be the best example to work upon. Among the Jassidae a genus such as *Eurymela* would be a better subject; some of the Cercopidae would be still better.

(2) The late second or early third instar is too old; already great changes have taken place. Singh-Pruthi's ninth sternite is most likely a secondary development similar to *d* in Figure 5 in the female *Flaccia conspersa*. To determine this it must be followed from the first instar.

(3) Other workers have shown that in the first instar there are two pairs of processes, one *behind, or posterior to*, the other.

(4) I know of no other instance in insect morphology where

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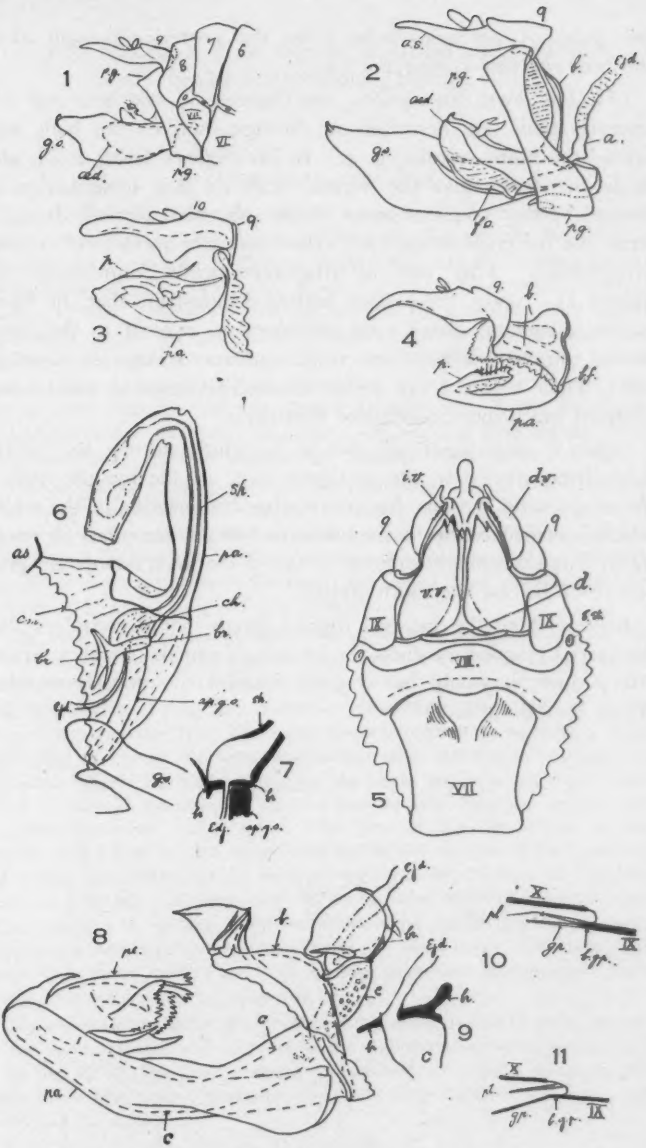
[1] Quarterly Journal Microp. Society, 69, B 1, 1924, pp. 59-96.

EXPLANATION OF PLATE XI.

Fig. 1. *Lydda elongata*, right side view of apex of abdomen of male.
Fig. 2. *Lydda elongata*, right side view of genitalia with right genital style missing.
Fig. 3. *Lamenia caliginea*, right side view of aedeagus and anal segments.
Fig. 4. *Zeugma monticola*, right side view of aedeagus and anal segment.
Fig. 5. *Flaccia conspersa*, ventral view of VII, VIII, and genitalia.
Fig. 6. *Pintalia*, lateral view of aedeagus showing internal structure of sheath, bridge, and apodeme.
Fig. 7. Diagrammatic section through chamber, bridge, and apex of apodeme.
Fig. 8. *Phaciocephalus vitiensis*, lateral view aedeagus.
Fig. 9. Diagrammatic section through bridge.
Fig. 10. Diagrammatic longitudinal section through IX and X of nymph from Pruthi's statement.
Fig. 11. Diagrammatic longitudinal section through IX and X of nymph from Pruthi's figures.

LETTERING ON FIGURES.

a. Chitinized portion of ejaculatory duct.
aed. Aedeagus.
ap. g. s. Apodeme of genital styles.
as. Anal segment.
b. Development of base of aedeagus.
b. f. Basal foramen.
b. gp. Base of genital plates.
br. Bridge.
c. Enlarged portion of ejaculatory duct.
ch. Chamber.
cm. Connecting membrane.
d. Sclerite connecting bases of v. v.
d. v. Dorsal valvae or posterior gonapophyses.
ejd. Ejaculatory duct.
f. o. Functional orifice.
g. c. Genital invagination.
g. p. Genital plates.
g. s. Genital styles.
i. v. Inner valvae or median gonapophyses.
p. Penis.
pa. Periandrium.
pg. Pygofer.
pl. Parameres (genital styles).
sh. Sheath.
v. v. Ventral valvae or anterior gonapophyses.
6-9. Tergites.
VI-IX. Sternites.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Genitalia of Rhynchota

two pairs of processes arise from the posterior margin of a sternite, *one pair behind the other.*

(5) His own descriptions and figures do not bear out his interpretation. He describes an "invagination of the body-wall behind the ninth sternite, g. c." In his Figures 1c-1g, 2c-2f, and 3a-3e he shows that the ventral wall of this invagination is formed by the "common bases of the subgenital plates" (b. gp.), while the paramere-lobes (pl) arise from the dorsal wall of this invagination. This can be diagrammatically represented by Figure 11. Again, these same figures demonstrate that the bases of the subgenital plates were considerably anterior to the bases of the paramere-lobes, even at this advanced stage of development. Thus, before I can accept his interpretation he must bring forward much more conclusive evidence.

Again I must point out that as no ninth sternite has so far been demonstrated in the youngest stage of the nymph, and as there are valid reasons for considering the sclerite in the adult, which is considered to be the ninth, as being a secondary development, it is exceedingly difficult to say if the male gonopore opens before or behind the ninth sternite.

In describing the internal organs Singh-Pruthi considers that the paired ejaculatory ducts do not arise from the common ejaculatory duct; it would be of great interest to know from what points they do arise.

Atopocixius, a New Genus of Uncertain Position in the Fulgoroidea (Hom.).

BY F. MUIR.

ATOPOCIXIUS Gen. Nov.

Length of vertex in middle slightly greater than width between basal angles, base slightly concavely emarginate, apex about half the width of base, no transverse carina dividing frons from vertex, a median longitudinal carina continuing on to the frons. Length of frons twice the width, narrow at base, gradually increasing in width till near apex, then slightly narrowing, lateral carinae distinct, margins arcuate on apical two-thirds, median carina distinct till near apex where it fades out. No median ocellus. Clypeus tricarinate. Antennae small, second segment globose. Pronotum fairly long, hind margin slightly arcuately emarginate, tricarinate; mesonotum wider than long, tricarinate, not reaching hind margin. Hind tibiae unarmed. Abdomen considerably flattened horizontally.

The Sc and R forming part of the nodal line, Sc + R and M forking near base, making only a very short common stalk of Sc + R + M, the M and Cu forks on nodal line, claval fork about middle of clavus, entering hind margin before apex. When at rest the tegmina widely tectiform, apices not meeting together, the apical portion of hind margins not overlapping. The costal margin fairly thick.

The male genitalia are figured. The pygofer laterally compressed, ventrally not very long. Anal segment large but not very long, apex produced into two stout, curved, asymmetrical spines, the right longer than the left. The periandrium is large, the ventral surface chitinized, a pair of slender processes projecting from the apex, the sides membranous with a large, flat spine, acute at the apex, supporting each side; open dorsally and apically. Within the periandrium lies the penis, which is not quite understood at present; ventrally it forms a more or less chitinized surface with a strong chitinized dorsal spine. The base of the periandrium is connected with a pair of flat, curved sclerites on the surface of the membrane connecting the aedeagus with the anal segment. At the base of the penis there is a round, chitinous body which appears to be the bridge, from which projects a rod-like hollow apodeme. The ejaculatory duct appears to proceed from the bridge. There being no basal plate, there is no apodeme from it to the bridge. The genital styles are consolidated into a single body with a pair of apodemes.

The abdominal sternites are greatly dechitinized, the sixth being reduced to two small sclerites, and the seventh and eighth entirely membranous.

In the female the genital styles (ovipositor) are small, flattened, and their bases wide apart; internally there is a large chamber, the basal half

chitinous or semichitinous, into which the spermatheca opens, the apical half membranous with its wall bearing a row of stiff hairs. The anterior styles are small, narrow and truncate at apex; the posterior styles are joined together at their base and form a bilobed process, the outer lobe acute, the inner broad and flat.

During copulation the distal portion of the periandrium and the two long ventro-distal processes enter this chamber; the curved spines on the anal segment of the male fasten behind the base of the eighth sternite and the curved apex of the genital styles behind the ninth tergite of the female.

Type: *A. ornatus.*

If we disregard the genitalia this genus belongs to the Cixiidae near to *Haplaxius* Fowler, from which it differs in the shape of the frons. Both the male and female genitalia show such strong differences from the cixiid type that it is impossible to place it into the Cixiidae. The genitalia come nearer to those of *Kinnara* or *Achilixia* and other of the Meenopline groups. I place it provisionally within the Cixiidae until such time as the genitalia of *Haplaxius* and allies are known. To ignore such profound differences as we find in these organs is impossible, both for systematists and phylogenists.

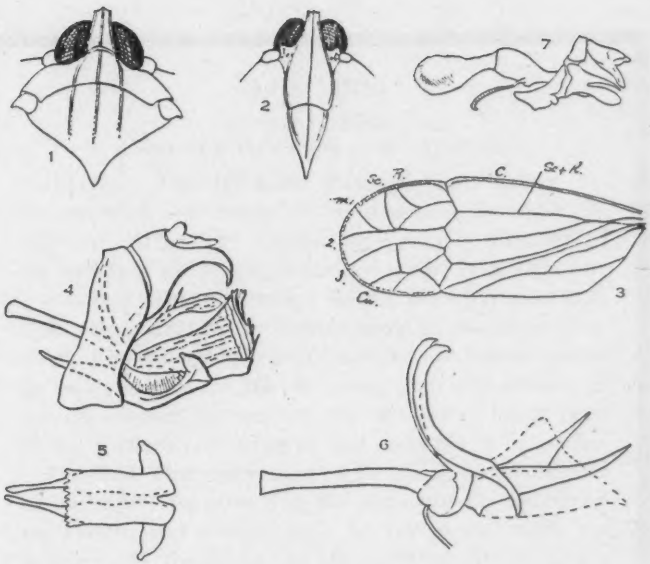
Atopocixius ornatus sp. n. Figures 1-7.

Male; length 1.6; tegmen, 1.9 mm.

Dark brown or black; apex of clypeus and labium except the apex, genae below antennae and in front of eyes, lateral carinae of frons and vertex and the median longitudinal carina of vertex, carinae and hind margin of pronotum expanding behind eyes, apex of mesonotum and the tegulae yellow or light brown, femora, tibiae and tarsi much lighter, pleura of abdomen yellow. Tegmina hyaline, dark brown with light, hyaline marks, one over apex of costal and radial cells, five smaller light areas from apex of costa around to Cu in apex between the apical veins, a darker, round brown mark over apical Cu vein and cell. The base of first claval, the greater portion of second claval veins and the greater portion of commissure yellow, other veins dark. Wings slightly fuscous, veins dark.

Female similar to male.

Described from six males and five females from Correfeur near Port au Prince, Haiti (*G. N. Wolcott,* No. 92-95), on *Lucuma domingensis.*



Atopocixius ornatus Muir

1. Dorsal view head and thorax.
2. Frontal view head.
3. Left tegmen.
4. Lateral view male genitalia.
5. Ventral view genital styles.
6. Lateral view penis.
7. Lateral view female genitalia.

OBITUARY.

Albert Koebele.

(Presented at the meeting of March 5, 1925.)

Whereas, The Hawaiian Entomological Society has learned with deep regret of the death on December 28, 1924, of Mr. Albert Koebele, an honorary member of the society since its organization in 1904; be it therefore

Resolved, That the society hereby place on record its high appreciation of his notable work as pioneer in Economic Entomology in Hawaii, and the invaluable services he has rendered in the discovery and introduction of natural enemies to many of the destructive insect pests of the gardens and crops of this country; be it further

Resolved, That this resolution be spread on the minutes of the society together with the accompanying biographical sketch, and that a copy be transmitted with the sympathy of the society to the bereaved widow, and a copy be also sent to the trustees of the Hawaiian Sugar Planters' Association.

Otto H. Swezey
W. M. Giffard
Fredk. Muir
Committee.

BIOGRAPHICAL SKETCH.

Mr. Albert Koebele was one of the first, if not the very first entomologist, to engage in the introduction of natural enemies as a method of combating insect pests. His early work in this line was in California, where he introduced from Australia in 1888-9 the lady beetle *Novius cardinalis* as an enemy to the cottony cushion scale, *Icerya purchasi*, a serious citrus pest. This was a remarkable success, and was considered to have saved the citrus industry from ruin. His work in Hawaii commenced in 1893. Between that date and 1900 he traveled extensively in search of beneficial insects for introduction to Hawaii, visiting Australia, Fiji, Japan, China, Ceylon, Mexico, and California. Many valuable lady beetles were secured, as well as parasites for scale insects and other pests. Many of these introductions were successful, and some of the fruit and garden pests were brought into subjection.

In 1902 the lantana insects were introduced from Mexico. There were eight species of these which became established and are effective, each in its own way, in checking seed production in lantana. In 1904, with Doctor Perkins, the enemies of the sugar-cane leafhopper were studied in Australia and the egg-parasite introduced, which greatly checked the leafhopper pest and enormously lessened the annual loss from the cane leafhopper. 1905 to 1907 were spent in Fiji, California, Arizona, and Mexico, studying sugar-cane insects and their parasites, enemies of horn-fly, and miscellaneous pests. A number of minor introductions were made. 1908 to 1910 were spent in Germany, giving a chance for recovery of his health, which had been impaired by so much time spent in exploration and research work in fever-infested regions of the tropics. At the same time he studied enemies of horn-fly, and sent over much material, but little if any success was attained by this.

During the earlier part of the time in Hawaii, Mr. Koebele was employed by the Territory; but the latter part he was on the entomological staff of the Experiment Station, Hawaiian Sugar Planters' Association. In 1910, on account of his failing health, he was relieved from active duty, but retained as Consulting Entomologist. He continued in Germany and was there

ALBERT KOEBELE

Enlargement from a snapshot taken in a Honolulu garden about 1900. (Courtesy of W. M. Giffard.)

during the Great War, on account of which he was reduced to very meager circumstances, and both he and his wife suffered great hardships. At the close of the war, as soon as it was learned of their circumstances, attempts were made by the Hawaiian Sugar Planters' Association to arrange for their return to their former home in Alameda, California, but by the time all arrangements were completed he had become too feeble for undertaking such a trip.

Mr. Koebele's death occurred December 28, 1924, in Germany where he went a few years before the Great War, and was engaged for a time in studying dipterous parasites, a number of which were sent to Honolulu in the hope that they might become established and be of some assistance against the horn-fly.

The services rendered by Mr. Koebele and the benefits derived by the agricultural and horticultural interests of Hawaii by his introduction of beneficial insects cannot be estimated in dollars and cents. He made the beginning in this line of work, and much of the time was working alone, yet seventeen species of lady beetles were successfully introduced by him and have become valuable factors in keeping reduced such pests as scale insects, mealybugs, plant lice and leaf mites. At least six other lady beetles were introduced and became established, but after a few years disappeared. The eight lantana insects were introduced by him, and about the same number of miscellaneous parasites of Diptera and Lepidoptera, etc. Following Mr. Koebele in this line of work, the other entomologists have introduced a larger number of beneficial insects, and some of them have produced more spectacular and valuable results, but this should not in any way lessen the credit to be given to him who was the pioneer in Hawaii in this important branch of entomological work.

Records of Immigrant Insects for 1925

BY THE EDITOR

In this list, those marked with an asterisk were observed for the first time in 1925. The others of the list were known before, some of them having been previously recorded, but others are now recorded for the first time, or at least their full names being now used for the first time. Those with double asterisk were previously recorded, but now described for the first time.

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